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## REVISION HISTORY

### 5/2017—Rev. A to Rev. B

|                                                                                                                    |            |
|--------------------------------------------------------------------------------------------------------------------|------------|
| Deleted ADR439 .....                                                                                               | Throughout |
| Added Pin Configuration and Function Descriptions Section,<br>Figure 2; Renumbered Sequentially, and Table 7 ..... | 7          |
| Changes to Typical Performance Characteristics Section.....                                                        | 8          |

### 8/2010—Rev. 0 to Rev. A

|                                 |            |
|---------------------------------|------------|
| Added ADR431-EP.....            | Throughout |
| Added ADR435-EP.....            | Throughout |
| Changes to Ordering Guide ..... | 8          |

### 7/2010—Revision 0: Initial Version

## SPECIFICATIONS

## ADR431-EP ELECTRICAL CHARACTERISTICS

$V_{IN} = 4.5\text{ V to }18\text{ V}$ ,  $I_L = 0\text{ mA}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 2.

| Parameter                        | Symbol                       | Test Conditions/Comments                                                                                                                                                                                                      | Min   | Typ   | Max                     | Unit                   |
|----------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------------------------|------------------------|
| OUTPUT VOLTAGE                   | $V_O$                        |                                                                                                                                                                                                                               | 2.499 | 2.500 | 2.501                   | V                      |
| INITIAL ACCURACY                 | $V_{OERR}$                   |                                                                                                                                                                                                                               |       |       | $\pm 1.0$<br>$\pm 0.04$ | mV<br>%                |
| TEMPERATURE COEFFICIENT          | $TCV_O$                      | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                |       | 1.5   | 5                       | ppm/ $^\circ\text{C}$  |
| LINE REGULATION                  | $\Delta V_O / \Delta V_{IN}$ | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                |       | 5     | 20                      | ppm/V                  |
| LOAD REGULATION                  | $\Delta V_O / \Delta I_L$    | $I_L = 0\text{ mA to }10\text{ mA}$ , $V_{IN} = 5\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$<br>$I_L = -10\text{ mA to }0\text{ mA}$ , $V_{IN} = 5\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$ |       |       | 15<br>15                | ppm/mA<br>ppm/mA       |
| QUIESCENT CURRENT                | $I_{IN}$                     | No load, $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                       |       | 580   | 800                     | $\mu\text{A}$          |
| VOLTAGE NOISE                    | $e_N$ p-p                    | 0.1 Hz to 10.0 Hz                                                                                                                                                                                                             |       | 3.5   |                         | $\mu\text{V p-p}$      |
| VOLTAGE NOISE DENSITY            | $e_N$                        | 1 kHz                                                                                                                                                                                                                         |       | 80    |                         | nV/ $\sqrt{\text{Hz}}$ |
| TURN ON SETTLING TIME            | $t_R$                        | $C_L = 0\text{ }\mu\text{F}$                                                                                                                                                                                                  |       | 10    |                         | $\mu\text{s}$          |
| LONG-TERM STABILITY <sup>1</sup> | $\Delta V_O$                 | 1000 hours                                                                                                                                                                                                                    |       | 40    |                         | ppm                    |
| OUTPUT VOLTAGE HYSTERESIS        | $V_{O\_HYS}$                 |                                                                                                                                                                                                                               |       | 20    |                         | ppm                    |
| RIPPLE REJECTION RATIO           | RRR                          | $f_{IN} = 1\text{ kHz}$                                                                                                                                                                                                       |       | -70   |                         | dB                     |
| SHORT CIRCUIT TO GND             | $I_{SC}$                     |                                                                                                                                                                                                                               |       | 40    |                         | mA                     |
| SUPPLY VOLTAGE OPERATING RANGE   | $V_{IN}$                     |                                                                                                                                                                                                                               | 4.5   |       | 18                      | V                      |
| SUPPLY VOLTAGE HEADROOM          | $V_{IN} - V_O$               |                                                                                                                                                                                                                               | 2     |       |                         | V                      |

<sup>1</sup> The long-term stability specification is noncumulative. The drift in subsequent 1000 hour periods is significantly lower than in the first 1000 hour period.

**ADR434-EP ELECTRICAL CHARACTERISTICS**

$V_{IN} = 6.1\text{ V}$  to  $18\text{ V}$ ,  $I_L = 0\text{ mA}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 3.

| Parameter                        | Symbol                       | Test Conditions/Comments                                                                                                                                                                                                          | Min    | Typ   | Max                     | Unit                   |
|----------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------------------------|------------------------|
| OUTPUT VOLTAGE                   | $V_O$                        |                                                                                                                                                                                                                                   | 4.0945 | 4.096 | 4.0975                  | V                      |
| INITIAL ACCURACY                 | $V_{OERR}$                   |                                                                                                                                                                                                                                   |        |       | $\pm 1.5$<br>$\pm 0.04$ | mV<br>%                |
| TEMPERATURE COEFFICIENT          | $TCV_O$                      | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                    |        | 1     | 3                       | ppm/ $^\circ\text{C}$  |
| LINE REGULATION                  | $\Delta V_O / \Delta V_{IN}$ | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                    |        | 5     | 20                      | ppm/V                  |
| LOAD REGULATION                  | $\Delta V_O / \Delta I_L$    | $I_L = 0\text{ mA}$ to $10\text{ mA}$ , $V_{IN} = 7\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$<br>$I_L = -10\text{ mA}$ to $0\text{ mA}$ , $V_{IN} = 7\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$ |        |       | 15<br>15                | ppm/mA<br>ppm/mA       |
| QUIESCENT CURRENT                | $I_{IN}$                     | No load, $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                           |        | 595   | 800                     | $\mu\text{A}$          |
| VOLTAGE NOISE                    | $e_N$ p-p                    | 0.1 Hz to 10.0 Hz                                                                                                                                                                                                                 |        | 6.25  |                         | $\mu\text{V}$ p-p      |
| VOLTAGE NOISE DENSITY            | $e_N$                        | 1 kHz                                                                                                                                                                                                                             |        | 100   |                         | nV/ $\sqrt{\text{Hz}}$ |
| TURN ON SETTLING TIME            | $t_R$                        | $C_L = 0\text{ }\mu\text{F}$                                                                                                                                                                                                      |        | 10    |                         | $\mu\text{s}$          |
| LONG-TERM STABILITY <sup>1</sup> | $\Delta V_O$                 | 1000 hours                                                                                                                                                                                                                        |        | 40    |                         | ppm                    |
| OUTPUT VOLTAGE HYSTERESIS        | $V_{O\_HYS}$                 |                                                                                                                                                                                                                                   |        | 20    |                         | ppm                    |
| RIPPLE REJECTION RATIO           | RRR                          | $f_{IN} = 1\text{ kHz}$                                                                                                                                                                                                           |        | -70   |                         | dB                     |
| SHORT CIRCUIT TO GND             | $I_{SC}$                     |                                                                                                                                                                                                                                   |        | 40    |                         | mA                     |
| SUPPLY VOLTAGE OPERATING RANGE   | $V_{IN}$                     |                                                                                                                                                                                                                                   | 6.1    |       | 18                      | V                      |
| SUPPLY VOLTAGE HEADROOM          | $V_{IN} - V_O$               |                                                                                                                                                                                                                                   | 2      |       |                         | V                      |

<sup>1</sup> The long-term stability specification is noncumulative. The drift in subsequent 1000 hour periods is significantly lower than in the first 1000 hour period.

**ADR435-EP ELECTRICAL CHARACTERISTICS**

$V_{IN} = 7.0\text{ V to }18\text{ V}$ ,  $I_L = 0\text{ mA}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

**Table 4.**

| Parameter                        | Symbol                       | Test Conditions/Comments                                                                                                                                                                                                      | Min   | Typ   | Max                     | Unit                   |
|----------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------------------------|------------------------|
| OUTPUT VOLTAGE                   | $V_O$                        |                                                                                                                                                                                                                               | 4.998 | 5.000 | 5.002                   | V                      |
| INITIAL ACCURACY                 | $V_{OERR}$                   |                                                                                                                                                                                                                               |       |       | $\pm 2.0$<br>$\pm 0.04$ | mV<br>%                |
| TEMPERATURE COEFFICIENT          | $TCV_O$                      | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                |       | 1     | 3                       | ppm/ $^\circ\text{C}$  |
| LINE REGULATION                  | $\Delta V_O / \Delta V_{IN}$ | $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                                |       | 5     | 20                      | ppm/V                  |
| LOAD REGULATION                  | $\Delta V_O / \Delta I_L$    | $I_L = 0\text{ mA to }10\text{ mA}$ , $V_{IN} = 8\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$<br>$I_L = -10\text{ mA to }0\text{ mA}$ , $V_{IN} = 8\text{ V}$ , $-55^\circ\text{C} < T_A < +125^\circ\text{C}$ |       |       | 15<br>15                | ppm/mA<br>ppm/mA       |
| QUIESCENT CURRENT                | $I_{IN}$                     | No load, $-55^\circ\text{C} < T_A < +125^\circ\text{C}$                                                                                                                                                                       |       | 620   | 800                     | $\mu\text{A}$          |
| VOLTAGE NOISE                    | $e_N$ p-p                    | 0.1 Hz to 10.0 Hz                                                                                                                                                                                                             |       | 8     |                         | $\mu\text{V p-p}$      |
| VOLTAGE NOISE DENSITY            | $e_N$                        | 1 kHz                                                                                                                                                                                                                         |       | 115   |                         | nV/ $\sqrt{\text{Hz}}$ |
| TURN ON SETTLING TIME            | $t_R$                        | $C_L = 0\text{ }\mu\text{F}$                                                                                                                                                                                                  |       | 10    |                         | $\mu\text{s}$          |
| LONG-TERM STABILITY <sup>1</sup> | $\Delta V_O$                 | 1000 hours                                                                                                                                                                                                                    |       | 40    |                         | ppm                    |
| OUTPUT VOLTAGE HYSTERESIS        | $V_{O\_HYS}$                 |                                                                                                                                                                                                                               |       | 20    |                         | ppm                    |
| RIPPLE REJECTION RATIO           | RRR                          | $f_{IN} = 1\text{ kHz}$                                                                                                                                                                                                       |       | -70   |                         | dB                     |
| SHORT CIRCUIT TO GND             | $I_{SC}$                     |                                                                                                                                                                                                                               |       | 40    |                         | mA                     |
| SUPPLY VOLTAGE OPERATING RANGE   | $V_{IN}$                     |                                                                                                                                                                                                                               | 7.0   |       | 18                      | V                      |
| SUPPLY VOLTAGE HEADROOM          | $V_{IN} - V_O$               |                                                                                                                                                                                                                               | 2     |       |                         | V                      |

<sup>1</sup> The long-term stability specification is noncumulative. The drift in subsequent 1000 hour periods is significantly lower than in the first 1000 hour period.

## ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 5.

| Parameter                            | Rating                                      |
|--------------------------------------|---------------------------------------------|
| Supply Voltage                       | 20 V                                        |
| Output Short-Circuit Duration to GND | Indefinite                                  |
| Storage Temperature Range            | $-65^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Operating Temperature Range          | $-55^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Junction Temperature Range           | $-65^\circ\text{C}$ to $+150^\circ\text{C}$ |
| Lead Temperature, Soldering (60 sec) | $300^\circ\text{C}$                         |

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability.

## THERMAL RESISTANCE

$\theta_{JA}$  is specified for the worst-case conditions, that is, a device soldered in a circuit board for surface-mount packages.

Table 6. Thermal Resistance

| Package Type        | $\theta_{JA}$ | $\theta_{JC}$ | Unit                      |
|---------------------|---------------|---------------|---------------------------|
| 8-Lead SOIC_N (R-8) | 130           | 43            | $^\circ\text{C}/\text{W}$ |

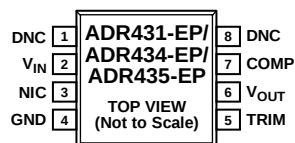
## ESD CAUTION



### ESD (electrostatic discharge) sensitive device.

Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

## PIN CONFIGURATION AND FUNCTION DESCRIPTIONS



## NOTES

1. NIC = NOT INTERNALLY CONNECTED. THIS PIN IS NOT CONNECTED INTERNALLY.
2. DNC = DO NOT CONNECT. DO NOT CONNECT TO THIS PIN.

0921B-101

Figure 2. Pin Configuration

Table 7. Pin Function Descriptions

| Pin No. | Mnemonic         | Description                                                                                                            |
|---------|------------------|------------------------------------------------------------------------------------------------------------------------|
| 1, 8    | DNC              | Do Not Connect. Do not connect to this pin.                                                                            |
| 2       | V <sub>IN</sub>  | Input Voltage Connection.                                                                                              |
| 3       | NIC              | Not Internally Connected. This pin is not connected internally.                                                        |
| 4       | GND              | Ground.                                                                                                                |
| 5       | TRIM             | Output Voltage Trim.                                                                                                   |
| 6       | V <sub>OUT</sub> | Output Voltage.                                                                                                        |
| 7       | COMP             | Compensation Input. Connect a series resistor capacitor network from COMP to V <sub>OUT</sub> to reduce overall noise. |

TYPICAL PERFORMANCE CHARACTERISTICS

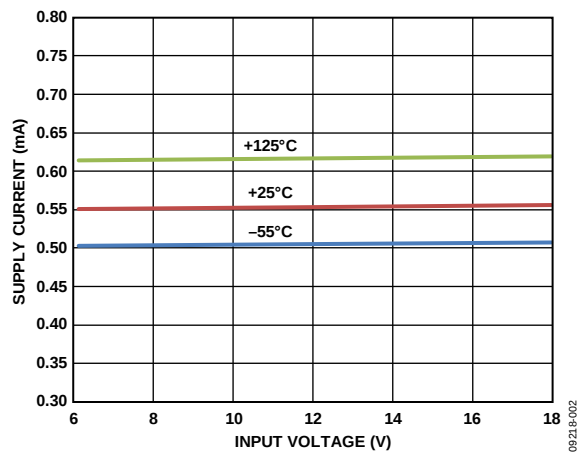
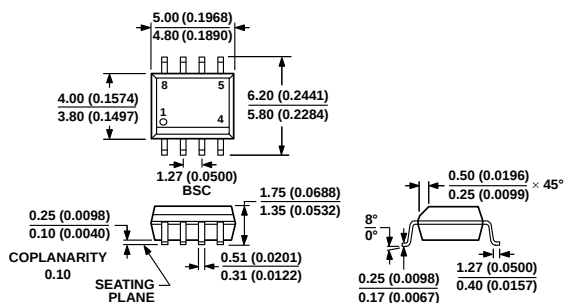


Figure 3. Supply Current vs. Input Voltage at Various Temperatures

## OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA  
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS  
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR  
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 4. 8-Lead Standard Small Outline Package [SOIC\_N]  
Narrow Body  
(R-8)

Dimensions shown in millimeters and (inches)

## ORDERING GUIDE

| Model <sup>1</sup> | Output Voltage (V) | Initial Accuracy, ± |      | Temperature Coefficient Package (ppm/°C) | Temperature Range | Package Description | Package Option | Ordering Quantity |
|--------------------|--------------------|---------------------|------|------------------------------------------|-------------------|---------------------|----------------|-------------------|
|                    |                    | (mV)                | (%)  |                                          |                   |                     |                |                   |
| ADR431TRZ-EP       | 2.500              | 1.0                 | 0.04 | 5                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 98                |
| ADR431TRZ-EP-R7    | 2.500              | 1.0                 | 0.04 | 5                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 1,000             |
| ADR434TRZ-EP       | 4.096              | 1.5                 | 0.04 | 3                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 98                |
| ADR434TRZ-EP-R7    | 4.096              | 1.5                 | 0.04 | 3                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 1,000             |
| ADR435TRZ-EP       | 5.000              | 2.0                 | 0.04 | 3                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 98                |
| ADR435TRZ-EP-R7    | 5.000              | 2.0                 | 0.04 | 3                                        | −55°C to +125°C   | 8-Lead SOIC_N       | R-8            | 1,000             |

<sup>1</sup> Z = RoHS Compliant Part.