

### FEATURES

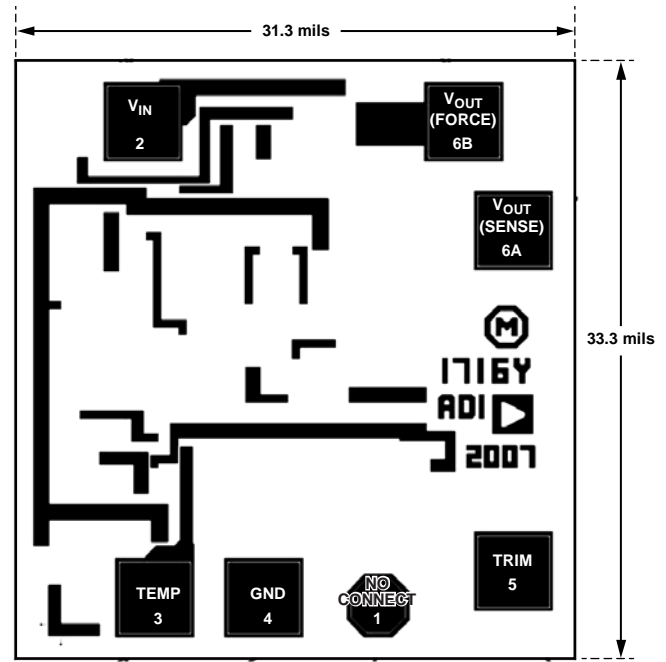
- High output accuracy: 5.0 V,  $\pm 0.1\%$  maximum**
- Excellent temperature stability: 3 ppm/ $^{\circ}\text{C}$  typical**
- Low noise: 10  $\mu\text{V}$  p-p typical**
- High supply voltage range: 7.0 V to 36.0 V maximum**
- Low supply current: 1 mA maximum**
- High load driving capability: 10 mA maximum**
- Temperature output function**
- Output trim functionality**
- Meets typical A Grade SOIC [ADR02](#) performance**

### GENERAL DESCRIPTION

The [ADR02](#) is a precision band gap voltage reference featuring high accuracy, high stability, and low power consumption. With an external buffer and a simple resistor network, the TEMP terminal can be used for temperature sensing and approximation. A TRIM terminal is provided on the device for fine adjustment of the output voltage.

The [ADR02](#) die is specified for  $25^{\circ}\text{C}$  only; however, it is functional over the  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  temperature range. Performance meets the A Grade SOIC in operation and application. Additional application and technical information can be found in the [ADR02](#) data sheet.

### ADR02 CHIP DIMENSIONS



NOTES  
1. BOTH  $V_{\text{OUT}}$  PADS MUST BE CONNECTED TO THE OUTPUT.

Figure 1.

Table 1. Die Physical Characteristics

Parameter	Value
Die Size Maximum	31.3 mils $\times$ 33.3 mils
Back Grind Thickness	19 mils
Bond Pad Opening Size	92 $\mu\text{m}$ $\times$ 92 $\mu\text{m}$
Top Metal Composition	AlCu (0.5%)
Passivation	OxyNitride
Polyimide	None
Die Marker	1716Y
Substrate Bias	GND

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**REVISION HISTORY**

5/14—Revision 0: Initial Version

## SPECIFICATIONS

$V_{IN} = 7.0\text{ V to }36.0\text{ V}$ ,  $I_{LOAD} = 0\text{ mA}$ , and  $25^{\circ}\text{C}$ , unless otherwise noted.

Due to variations in assembly methods and normal yield loss, yield after packaging is not guaranteed for standard product dice.

**Table 2.**

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
OUTPUT VOLTAGE	$V_O$		4.995	5.000	5.005	V
Temperature Coefficient	$T_{CVO}$	$-40^{\circ}\text{C} < T_A < +125^{\circ}\text{C}$		3		ppm/ $^{\circ}\text{C}$
Initial Accuracy	$V_{OERR}$		-5		+5	mV
REGULATION						
Line Regulation	$\Delta V_O/\Delta V_{IN}$	$V_{IN} = 7\text{ V to }36\text{ V}$		7	30	ppm/V
Load Regulation	$\Delta V_O/\Delta I_{LOAD}$	$V_{IN} = 15\text{ V}$ , $I_{LOAD} = 0\text{ mA to }10\text{ mA}$		40	70	ppm/mA
DROPOUT VOLTAGE	$V_{DO}$		2			V
VOLTAGE NOISE						
0.1 Hz to 10.0 Hz	$e_{N\text{ p-p}}$			10		$\mu\text{V p-p}$
1 kHz	$e_N$			230		nV/ $\sqrt{\text{Hz}}$
CURRENT						
Short-Circuit Current	$I_{SC}$			30		mA
Quiescent Current	$I_{IN}$			0.65	1	mA
TURN-IN SETTling TIME	$t_R$			4		$\mu\text{s}$
LONG-TERM STABILITY	$\Delta V_O$	1000 hours		50		ppm
OUTPUT VOLTAGE HYSTERESIS	$\Delta V_{O\_HYS}$			75		ppm
RIPPLE REJECTION RATIO	RRR	$f_{IN} = 10\text{ kHz}$		-75		dB
TEMPERATURE SENSOR						
Voltage Output at TEMP Pin	$V_{TEMP}$			550		mV
Temperature Sensitivity	$TCV_{TEMP}$			1.96		mV/ $^{\circ}\text{C}$

## ABSOLUTE MAXIMUM RATINGS

Table 3.

Parameter	Rating
Supply Voltage	36 V
Output Short-Circuit Duration to GND	Indefinite
Operating Temperature	25°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.

### 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.

## OUTLINE DIMENSIONS

### DIE PAD DESCRIPTIONS

Die center is the reference location at  $0.0\ \mu\text{m} \times 0.0\ \mu\text{m}$ . Pad coordinates are to the center of each pad. Die edges may contain cosmetic damage from the die separation process. This cosmetic damage is not considered a reliability issue.

**Table 4. Pad Mnemonics, Function Descriptions, Coordinates**

Pad Number	Mnemonic	Description	Pad Coordinates ( $\mu\text{m}$ )
1	NC	No Connect	Not applicable
2	V <sub>IN</sub>	Input Supply Voltage	-195 × +306
3	TEMP	Temperature Adjustment	-180 × -306
4	GND	Ground	-40 × -306
5	TRIM	Trim	+281 × -272
6A	V <sub>OUT</sub> (SENSE)	Connect Output to Both Pads	+281 × +166
6B	V <sub>OUT</sub> (FORCE)	Connect Output to Both Pads	+217 × +306

**Table 5. Assembly Recommendations**

Assembly Component	Recommendation
Die Attach	Epoxy adhesive
Bonding Method	Gold ball or Aluminum wedge
Bonding Sequence	GND first

### ORDERING GUIDE

Model	Functional Temperature Range	Package Description/Quantity	Package Option
ADRO2ACHIPS	-40°C to +125°C	Waffle Pack/400	DIE

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