

FEATURES

Extreme high temperature operation
 -40°C to +210°C
Temperature coefficient: 40 ppm/°C typical
High output current: 10 mA
Low supply current: 60 µA maximum
Initial accuracy: ±2.4% (±60 mV maximum)
Low dropout voltage

APPLICATIONS

Downhole drilling and instrumentation
Avionics
Heavy industrial
High temperature environments

GENERAL DESCRIPTION

The **ADR225-KGD-CHIPS** is a precision 2.5 V band gap voltage reference specified for a high temperature operation of 210°C. It uses a micropower core topology and laser trimming of highly stable, thin film resistors to achieve a temperature coefficient of 80 ppm/°C (maximum) up to 210°C and an initial accuracy of 2.4% (±60 mV maximum). A maximum operating current of 60 µA and a low dropout voltage allow the **ADR225-KGD-CHIPS** to function very well in battery-powered equipment.

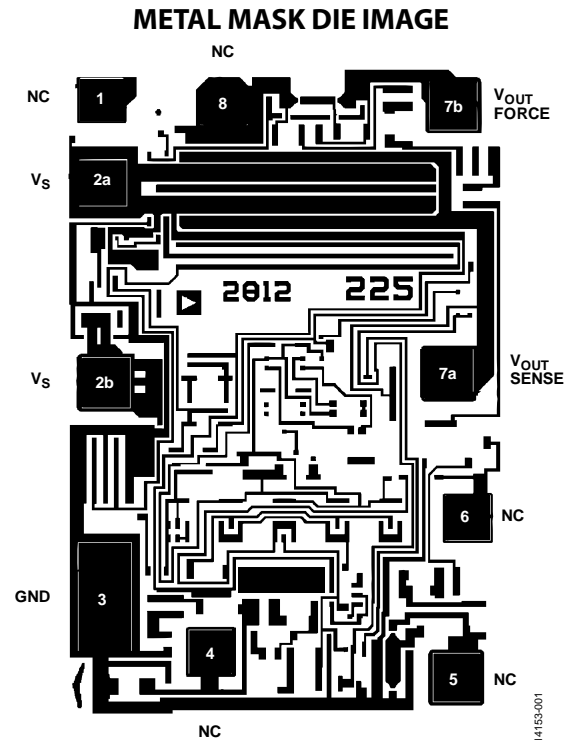


Figure 1.

The **ADR225-KGD-CHIPS** is a member of a growing series of high temperature qualified products offered by Analog Devices, Inc. For a complete selection table of the available high temperature products, see the high temperature product list and qualification data available at www.analog.com/hightemp.

Additional application and technical information can be found in the **ADR225** data sheet.

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REVISION HISTORY

2/16—Revision 0: Initial Version

SPECIFICATIONS

$V_{IN} = 3.3\text{ V}$, $V_{OUT} = 2.5\text{ V}$, $T_{MIN} < T_A < T_{MAX}$, unless otherwise noted. Due to variations in assembly methods and normal yield loss, yield after packaging is not guaranteed for standard product dice.

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
SUPPLY CURRENT	I_{SY}	No load		40	60	μA
INITIAL ACCURACY ¹	V_{OUT}	$I_{OUT} = 0\text{ mA}$		± 5	± 60 ± 2.4	mV %
TEMPERATURE COEFFICIENT ²	TCV_{OUT}	$I_{OUT} = 0\text{ mA}$		40	80	ppm/ $^{\circ}\text{C}$
REGULATION						
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	$3.0\text{ V} \leq V_S \leq 15\text{ V}$, $I_{OUT} = 0\text{ mA}$		0.25	1.5	mV/V
Load Regulation ³	$\Delta V_{OUT}/\Delta I_{LOAD}$	$V_S = 5.0\text{ V}$, $0\text{ mA} \leq I_{OUT} \leq 10\text{ mA}$		0.25	1.5	mV/mA
VOLTAGE						
Dropout Voltage	$V_S - V_{OUT}$	$I_{LOAD} = 10\text{ mA}$			1.00	V
Noise Voltage	e_N	0.1 Hz to 10 Hz		25		$\mu\text{V p-p}$

¹ For proper operation, a 1 μF capacitor is required between the outputs (V_{OUT} SENSE and V_{OUT} FORCE) and the GND pad of the device.

² TCV_{OUT} is defined as the ratio of output change with temperature variation to the specified temperature range, expressed in ppm/ $^{\circ}\text{C}$.

$TCV_{OUT} = (V_{MAX} - V_{MIN})/V_{OUT}(T_{MAX} - T_{MIN})$

³ The load regulation specification includes the effect of self heating.

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	-0.3 V to +18 V
Output to GND	-0.3 V to $V_S + 0.3 V$
Operating Temperature Range	-40°C to +110°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.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

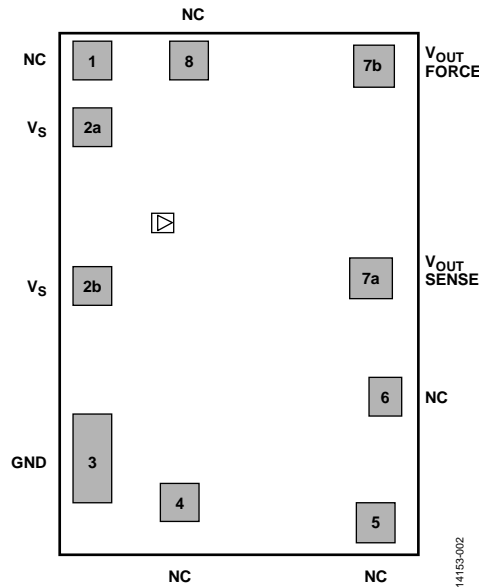


Figure 2. Pad Configuration

Table 3. Pad Function Descriptions¹

Pad No.	X-Axis (μm)	Y-Axis (μm)	Mnemonic	Description
1	-368	+587	NC	No Connect. Do not connect to this pad.
2a	-362	+423	V _S	Input. The input must be connected to both V _S pads.
2b	-360	+18	V _S	Input. The input must be connected to both V _S pads.
3	-362	-401	GND	Ground.
4	-149	-525	NC	No Connect. Do not connect to this pad.
5	+345	-577	NC	No Connect. Do not connect to this pad.
6	+368	-256	NC	No Connect. Do not connect to this pad.
7a	+330	+36	V _{OUT SENSE}	Sense Output. The output must be connected to both V _{OUT SENSE} and V _{OUT FORCE} pads.
7b	+339	+576	V _{OUT FORCE}	Force Output. The output must be connected to both V _{OUT SENSE} and V _{OUT FORCE} pads.
8	-122	+576	NC	No Connect. Do not connect to this pad.

¹ The die center is the reference location at 0.0 μm × 0.0 μm. The pad coordinates are to the center of each pad.

OUTLINE DIMENSIONS

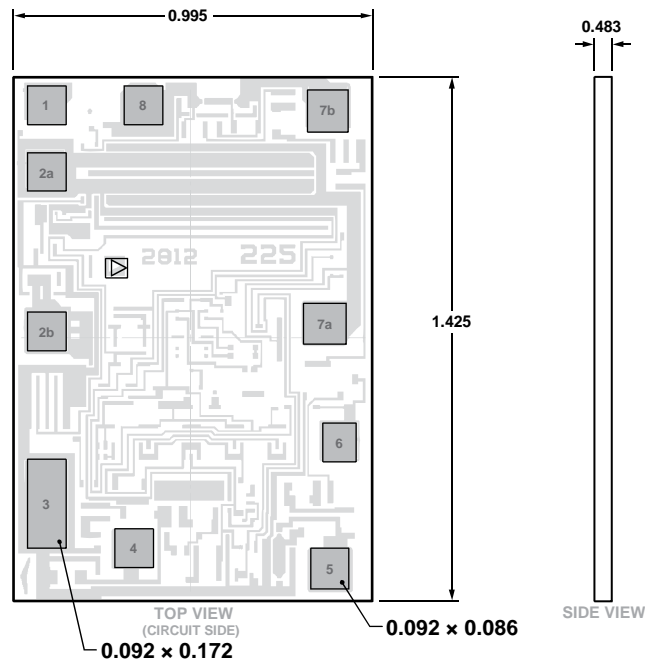


Figure 3. 8-Pad Bare Die [CHIP]
(C-8-7)
Dimensions shown in millimeters

Table 4. Die Specifications

Parameter	Value	Unit
Chip Size	920 × 1350	μm
Scribe Line Width	75 × 75	μm
Die Size	995 × 1425	μm
Thickness	483	μm
Bond Pad	92 × 86	μm
Bond Pad Composition	AlCu (0.5)	%
Passivation	Oxynitride	Not applicable
Polyimide	None	Not applicable
Die Marker	225	Not applicable
Backside	GND	Not applicable

Table 5. Assembly Recommendations

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

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADR225-KGD-CHIP	−40°C to +210°C	8-Pad Bare Die [CHIP]	C-8-7