

REF81 Temperature Controlled Precision Voltage Reference with 0.05ppm/°C Temperature Drift and < 1ppm Stability

1 Features

- Buried zener core 7.6V output
- Industry standard fixed output voltage
 - 1X gain: 2.5V, 4.096V, 5V
 - 2X gain: 5V, 8.192V, 10V
- No external buffer for 1X and 2X gain output
- Industry standard fixed output initial accuracy
 - 1X gain: $\pm 0.05\%$
 - 2X gain: $\pm 0.1\%$
- Ultra-low temperature drift: 0.05ppm/°C
- Operating temperature range: 0°C to 70°C
- Excellent long term stability: 0.3ppm (1khr to 5khr)
- 1/f noise (0.1Hz to 10Hz) : 0.15ppm_{pk-pk}
- Integrated heater with temperature stable indicator
- Input Voltage range: 10V to 16.5V
- Heater supply range: 10V to 42V
- Hermetically sealed ceramic package (20 pin LCCC)

2 Applications

- [Parametric measurement unit](#)
- [Lab and field instrumentation](#)
- [Precision weight scales](#)
- [Battery test equipment](#)
- [Digital multimeter](#)
- [Source measurement unit](#)
- [Data acquisition](#)

3 Description

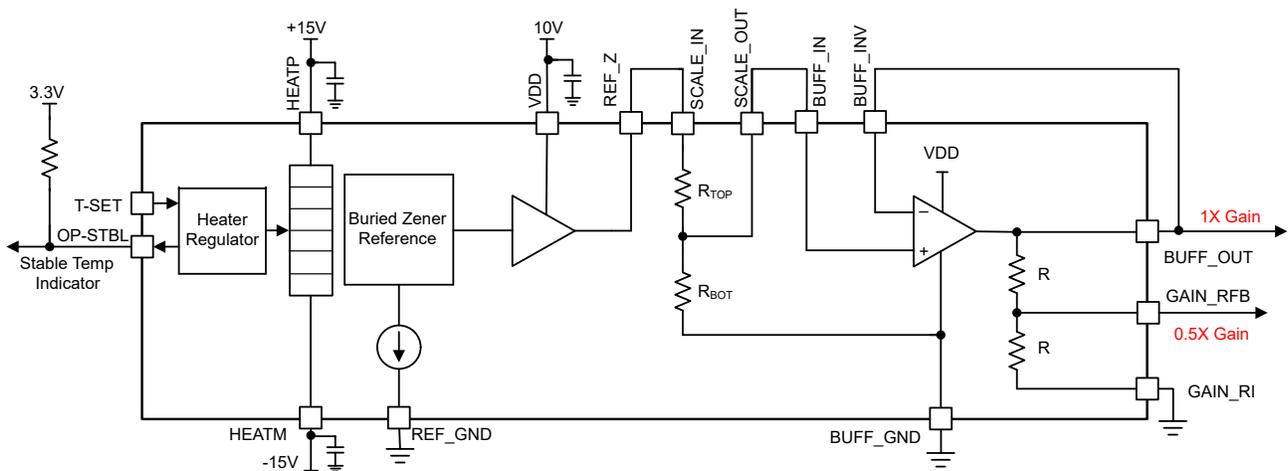
The REF81 device utilizes precision buried zener core with integrated heater to generate stable 7.6V. The device further integrates precision resistor dividers and a buffer to offer industry standard voltage references to drive precision data converters. Integrated temperature control with an internal heater enables the reference voltage stay constant irrespective of ambient temperature variations and achieve extremely low temperature drift of 0.05ppm/°C. The integration of control loop, precision resistances and buffer enables ease of design and eliminates need of external precision components.

The REF81 family is available in a 20-pin LCCC package. The LCCC package is a hermetically sealed ceramic package that enables ultra low long-term stability specification of 1ppm, critical for applications that demand a longer operational window without calibration. The package also offers excellent immunity against humidity variation.

Device Information

PART NAME	PACKAGE (1)	BODY SIZE (NOM) (2)
REF81	LCCC (20)	8.89mm × 8.89mm

- (1) For all available packages, see the orderable addendum at the end of the data sheet.
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.



REF81 Block Diagram (With Typical External Connections)



4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, [Voltage Reference Design Tips For Data Converters](#)
- Texas Instruments, [Voltage Reference Selection Basics](#)

4.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

4.3 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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4.4 Trademarks

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4.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

4.6 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
July 2025	*	Initial Release

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
PREF81410B1NAJT	Active	Preproduction	LCCC (NAJ) 20	250 SMALL T&R	-	Call TI	Call TI	0 to 70	
PREF81500B1NAJT	Active	Preproduction	LCCC (NAJ) 20	250 SMALL T&R	-	Call TI	Call TI	0 to 70	

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

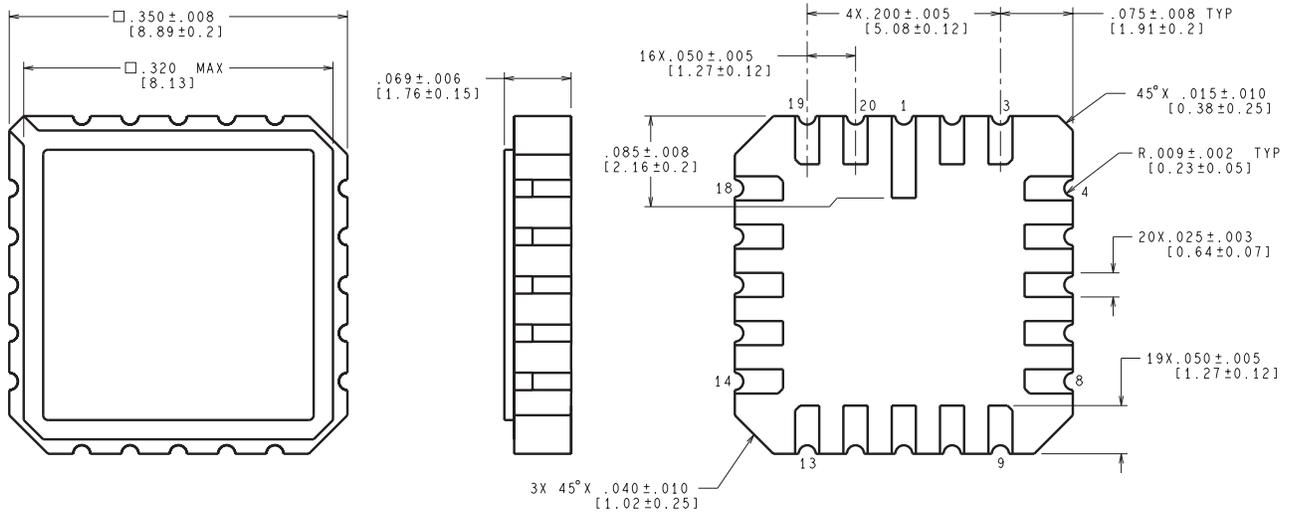
(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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