Ultracompact, Precision 2.5 V Voltage Reference

Enhanced Product

ADR03-EP

FEATURES

- Ultracompact SC70 package
- Low temperature coefficient: 3 ppm/°C
- Initial accuracy: 0.2%
- No external capacitor required
- Low voltage noise: 6 µV p-p (0.1 Hz to 10.0 Hz)
- Wide input voltage range: 4.5 V to 15.0 V
- High output load current: 10 mA

ENHANCED PRODUCT FEATURES

- Supports defense and aerospace applications (AQEC standard)
- Military temperature range −55°C to +125°C
- Controlled manufacturing baseline
- One assembly/test site
- One fabrication site
- Product change notification
- Qualification data available on request

APPLICATIONS

- Precision data acquisition systems
- High resolution converters
- Industrial process control systems
- Precision instruments
- Auto battery monitoring

PIN CONFIGURATION

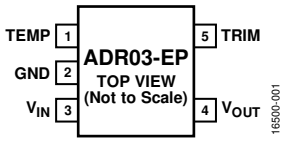

Figure 1.

GENERAL DESCRIPTION

The ADR03-EP is a precision 2.5 V band gap voltage reference featuring high accuracy, high stability, and low power consumption. The ADR03-EP is housed in a tiny 5-lead SC70 package. The small footprint and wide operating range make the ADR03-EP reference ideally suited for general-purpose and space-constrained applications.

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 devices for fine adjustment of the output voltage.

The ADR03-EP is a compact, low drift voltage reference that provides an extremely stable output voltage from a wide input voltage range. It is available in a 5-lead SC70 and is specified over the −55°C to +125°C military temperature range.

Additional application and technical information can be found in the ADR03 data sheet.

Rev. 0 Document Feedback

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REVISION HISTORY

1/2018—Revision 0: Initial Version

SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

Input voltage (V_{IN}) = 4.5 V to 15.0 V, T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Symbol	Test Conditions/Comments	Min	Typ	Max	Unit
OUTPUT VOLTAGE	V_O		2.495	2.500	2.505	V
INITIAL ACCURACY	V_{OERR}				5	mV
					0.2	%
TEMPERATURE COEFFICIENT	TCV_O	−55°C < T_A < +125°C		3	30	ppm/°C
DROPOUT VOLTAGE	V_{DO}		2			V
REGULATION						
Line	$\Delta V_O/\Delta V_{IN}$	V_{IN} = 4.5 V to 15.0 V, −55°C < T_A < +125°C		7	40	ppm/V
Load	$\Delta V_O/\Delta I_{LOAD}$	Load current (I_{LOAD}) = 0 mA to 10 mA, −55°C < T_A < +125°C, V_{IN} = 7.0 V		45	80	ppm/mA
QUIESCENT CURRENT	I_{IN}	No load, −55°C < T_A < +125°C		0.65	1	mA
VOLTAGE NOISE	$e_{N\ p-p}$	0.1 Hz to 10.0 Hz		6		µV p-p
Density	e_N	1 kHz		230		nV/√Hz
TURN-ON SETTLING TIME	t_R			4		µs
LONG-TERM STABILITY[1]	ΔV_O	1000 hours		50		ppm
OUTPUT VOLTAGE HYSTERESIS	ΔV_{O_HYS}			70		ppm
		−55°C < T_A < +125°C		80		ppm
RIPPLE REJECTION RATIO	RRR	Input frequency (f_{IN}) = 10 kHz		−75		dB
SHORT CIRCUIT TO GND	I_{SC}			30		mA
TEMPERATURE SENSOR						
Voltage Output at TEMP Pin	V_{TEMP}			550		mV
Temperature Sensitivity	TCV_{TEMP}			1.96		mV/°C

[1] 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

Ratings are at 25°C, unless otherwise noted.

Table 2.

Parameter	Rating
Supply Voltage	15.0 V
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−55°C to +125°C
Junction Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 60 sec)	260°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

Thermal performance is directly linked to PCB design and operating environment. Careful attention to PCB thermal design is required.

Table 3. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}	Unit
KS-5[1]	266.4	203.7	°C/W

[1] Test Condition 1: Thermal impedance simulated values are based on JEDEC 2S2P thermal test board. See JEDEC JESD-51.

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.

TYPICAL PERFORMANCE CHARACTERISTICS

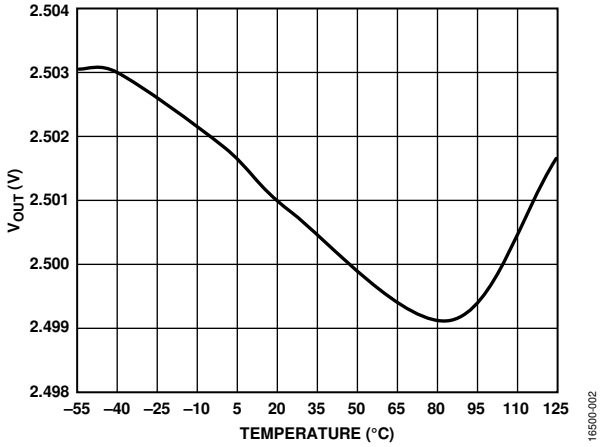

Figure 2. Typical Output Voltage (V_{OUT}) vs. Temperature

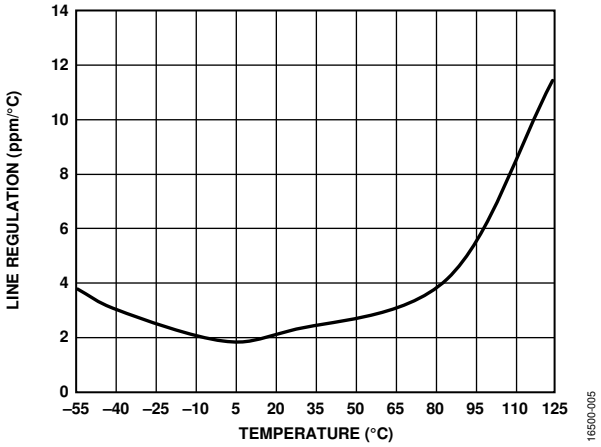

Figure 5. Line Regulation vs. Temperature

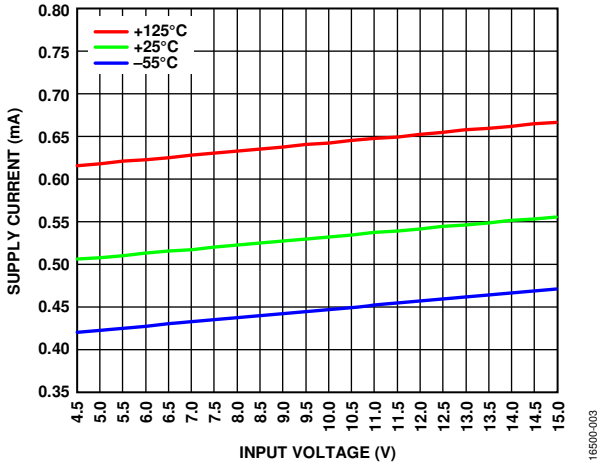

Figure 3. Supply Current vs. Input Voltage at Various Temperatures

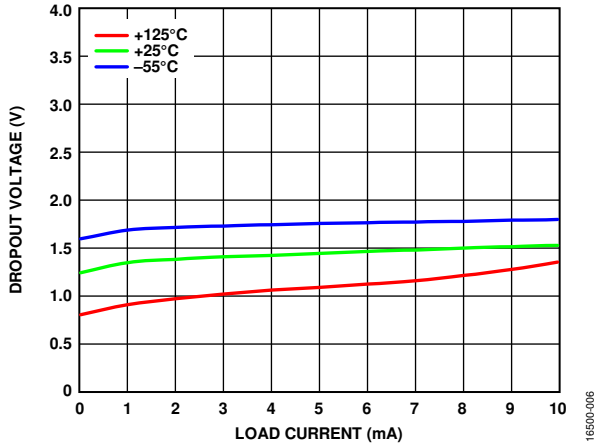

Figure 6. Dropout Voltage vs. Load Current at Various Temperatures

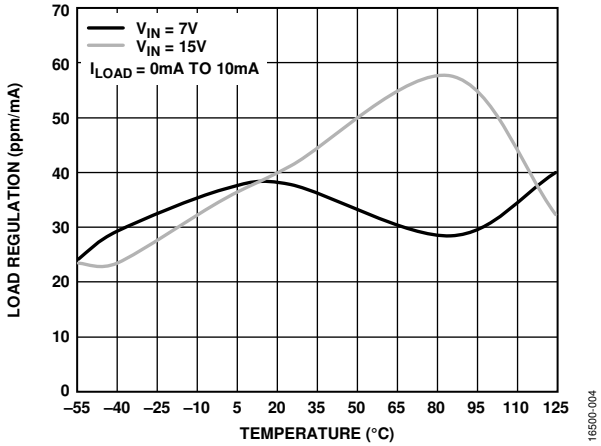

Figure 4. Load Regulation vs. Temperature at Various Input Voltages (V_{IN})

OUTLINE DIMENSIONS

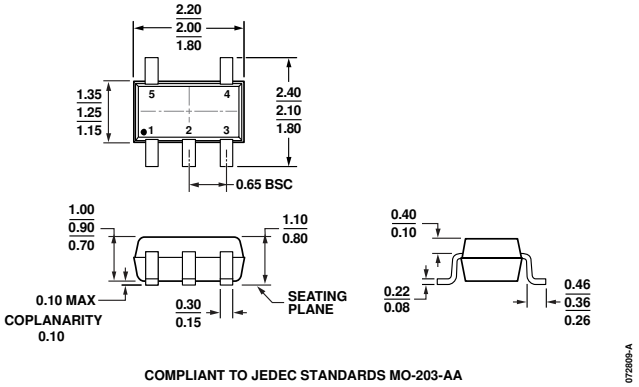

Figure 7. 5-Lead Thin Shrink Small Outline Transistor Package [SC70] (KS-5)
Dimensions shown in millimeters

ORDERING GUIDE

Model[1]	Output Voltage V_O (V)	Initial Accuracy (mV)	Initial Accuracy (%)	Temperature Coefficient (ppm/°C)	Temperature Range	Package Description	Package Option	Ordering Quantity	Marking Code
ADR03TKSZ-EP-R7	2.5	5	0.2	30	−55°C to +125°C	5-Lead SC70	KS-5	3,000	R3N

[1] Z = RoHS Compliant Part.

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