



# +5V Precision Voltage Reference/ Temperature Transducer

REF-02/883B

## 1.0 SCOPE

- 1.1 This specification covers the detail requirements for a precision voltage reference that provides a stable +5V output that can be adjusted over a  $\pm 3\%$  range with minimal effect on temperature stability. This circuit is processed in accordance with MIL-STD-883 and is fully compliant to paragraph 1.2.1.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace source control drawings.

For typical applications and operating characteristics, consult Maxim's data books.

## 1.2 Part Numbers

Device	Part Number
-1	REF-02A(X)/883B
-2	REF-02(X)/883B

## 1.3 Package

(X)	Package	Description
J	TV	8-Pin TO-99
Z	JA	8-Pin Ceramic Dual-In-Line Package (CERDIP)
RC	L-20	20-Pin Ceramic Leadless Chip Carrier (LCC)

**Note:** See *Package Information* section for package drawings and dimensions.

## 1.4 Absolute Maximum Ratings

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

Input Voltage	40V
Output Short-Circuit Duration (to GND or $V_{IN}$ )	Indefinite
Power Dissipation ( $T_A = +70^\circ\text{C}$ , $T_j = +150^\circ\text{C}$ )	
8-Pin TO-99 (derate $6.67\text{mW}/^\circ\text{C}$ above $+70^\circ\text{C}$ )	533mW
8-Pin CERDIP (derate $8.00\text{mW}/^\circ\text{C}$ above $+70^\circ\text{C}$ )	640mW
20-Pin LCC (derate $9.09\text{mW}/^\circ\text{C}$ above $+70^\circ\text{C}$ )	727mW
Operating Temperature Range	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage Temperature Range	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Lead Temperature (soldering, 10 sec)	$+300^\circ\text{C}$

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- 1.5 Thermal Resistance
- $\Theta_{JC} = 45^\circ\text{C}/\text{W}$  for H-08
  - $\Theta_{JC} = 55^\circ\text{C}/\text{W}$  for Q-8
  - $\Theta_{JC} = 55^\circ\text{C}/\text{W}$  for E-20
  - $\Theta_{JA} = 150^\circ\text{C}/\text{W}$  for H-08
  - $\Theta_{JA} = 125^\circ\text{C}/\text{W}$  for Q-8
  - $\Theta_{JA} = 110^\circ\text{C}/\text{W}$  for E-20

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## 2.0 REQUIREMENTS

2.1 Electrical performance characteristics are specified in Table 1 and apply over the full ambient operating temperature range, unless otherwise specified.

**TABLE 1. ELECTRICAL PERFORMANCE CHARACTERISTICS (Note 1)**

CHARACTERISTICS	SYMBOL	CONDITIONS	DEVICE TYPES	GROUP A SUB-GROUPS	LIMITS		UNITS
					MIN	MAX	
Quiescent Supply Current	$I_{IN}$	No load	-1, -2	1		1.4	mA
				2, 3		2.0	
Output Adjustment Range	$\Delta V_{TRIM}$	$R_P = 10k\Omega$	-1, -2	1	-3.0	3.0	%
Output Voltage	$V_O$	$I_L = 0mA$	-1	1	4.985	5.015	V
				2, 3	4.978	5.022	
			-2	1	4.975	5.025	
				2, 3	4.953	5.047	
Short-Circuit Current	$I_{SC}$	$V_O = 0V$	-1, -2	1	15	60	mA
Sink Current	$I_S$		-1, -2	1	-0.3		mA
Load Regulation (Note 2)	LD reg	$I_L = 0mA$ to 10mA	1	1		0.01	%/mA
				2, 3		0.012	
Line Regulation (Note 2)	LN reg	$V_{IN} = 8V$ to 33V	-1, -2	1		0.01	%/V
				2, 3		0.015	
Load Current (Note 3)	$I_L$		-1, -2	1	10		mA
Output Voltage Noise	$e_{np-p}$	0.1Hz to 10Hz	-1, -2	1		15	$\mu V_{p-p}$
Output Voltage Temperature Coefficient (Note 4)	$TCV_O$		-1	1, 2, 3	-8.5	8.5	ppm/ $^{\circ}C$
			-2	1, 2, 3	-25	25	

**Note 1:**  $V_{DD} = +15V$ ,  $V_{IN} = +15V$ , unless otherwise noted.

**Note 2:** Line and load regulation specifications include the effect of self-heating.

**Note 3:** Minimum 10mA load current guaranteed by load regulation test.

**Note 4:**  $TCV_O = \left( \frac{I_{V_{MAX}} - V_{MIN}}{10V} \right) \left( \frac{1}{180^{\circ}C} \times 10^6 \right)$  where  $-55^{\circ}C \leq T_A \leq +125^{\circ}C$ .

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## 3.0 QUALITY ASSURANCE

- 3.1** Sampling and inspection procedures shall be in accordance with MIL-M-38510 and, to the extent specified, with MIL-STD-883.
- 3.2** Screening shall be in accordance with Method 5004 of MIL-STD-883. Burn-in test (Method 1015):
- (1) Test condition A, B, C, or D.
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
  - (3) Interim and final electrical test requirements shall be as specified in Table 2.
- 3.3** Quality conformance inspection shall be in accordance with Method 5005 of MIL-STD-883 including Groups A, B, C, and D inspection.
- Group A inspection:
- (1) Tests as specified in Table 2.
  - (2) Selected subgroups in Table 1, Method 5005 of MIL-STD-883 shall be omitted.
- 3.4** Groups C and D inspections:
- a. End-point electrical parameters shall be specified in Table 1.
  - b. Steady-state life test (Method 1005 of MIL-STD-883):
    - (1) Test condition A, B, C, or D.
    - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
    - (3) Test duration, 1000 hours, except as permitted by Method 1005 of MIL-STD-883.

**TABLE 2. ELECTRICAL TEST REQUIREMENTS**

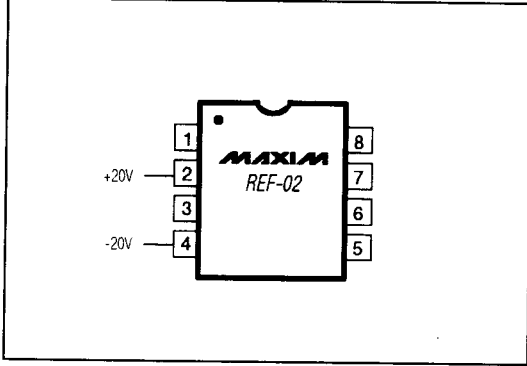
MIL-STD-883 Test Requirements	Subgroups (per Method 5005, Table 1)
Interim Electrical Parameters (Method 5004)	1
Final Electrical Parameters (Method 5004)	1,* 2, 3
Group A Test Requirements (Method 5005)	1, 2, 3
Groups C and D End-Point Electrical Parameters (Method 5005)	1

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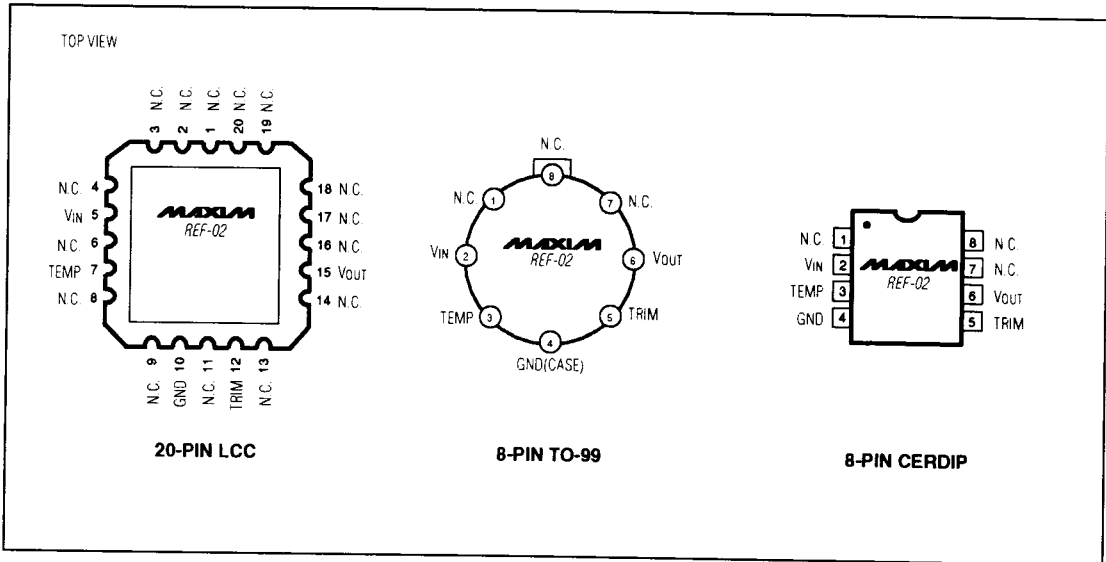
\*PDA applies to Subgroup 1 only.

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## **4.0 Life Test/Burn-In Circuit**

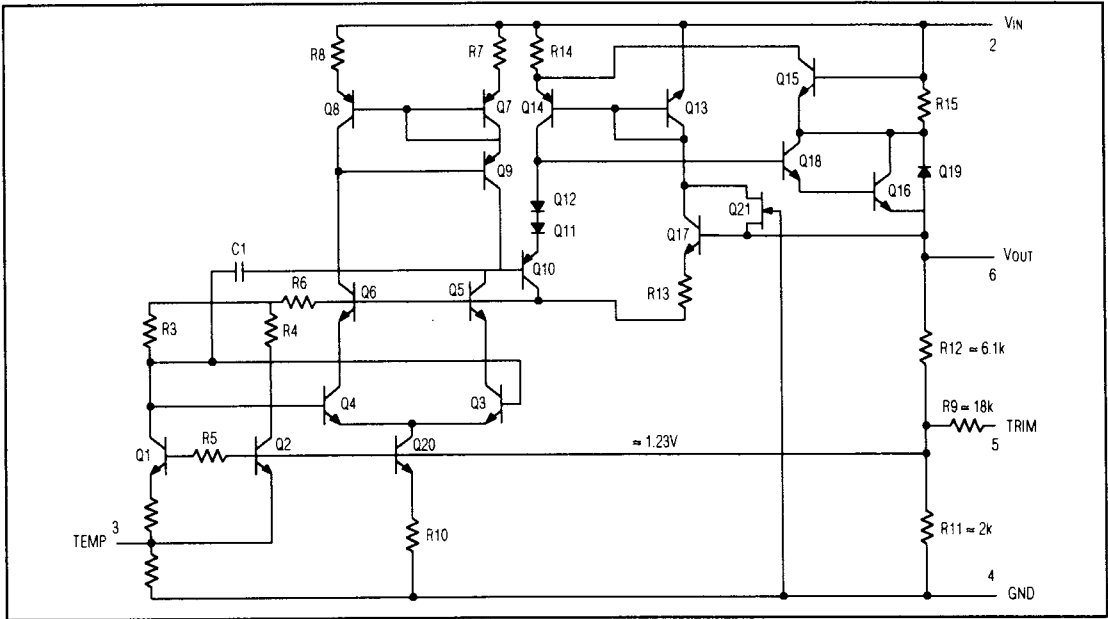


## **4.1 Pin Configurations**



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## 4.2 Simplified Schematic and Pin Connections



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