



# +10V Precision Voltage Reference

**REF-01/883B**

## 1.0 SCOPE

**1.1** This specification covers the detail requirements for a precision voltage reference that provides a stable +10V output and 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-01A(X)/883B |
| -2     | REF-01(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 6.67mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ )     | .533mW                                      |
| 8-Pin CERDIP (derate 8.00mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ )    | .640mW                                      |
| 20-Pin LCC (derate 9.09mW/ $^\circ\text{C}$ 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

- $\Theta_{JC} = 45^\circ\text{C/W}$  for TV
- $\Theta_{JC} = 55^\circ\text{C/W}$  for JA
- $\Theta_{JC} = 45^\circ\text{C/W}$  for LP
- $\Theta_{JA} = 150^\circ\text{C/W}$  for TV
- $\Theta_{JA} = 125^\circ\text{C/W}$  for JA
- $\Theta_{JA} = 150^\circ\text{C/W}$  for LP



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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                  | 9.970  | 10.030 | V             |
|   |                   |                       |              | 2, 3               | 9.955  | 10.045 |               |
|   |                   |                       | -2           | 1                  | 9.950  | 10.050 |               |
|   |                   |                       |              | 2, 3               | 9.905  | 10.095 |               |
| 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                  | 0.008  |        | %mA           |
|   |                   |                       |              | 2, 3               | 0.012  |        |               |
|   |                   |                       | -2           | 1                  | 0.010  |        |               |
|   |                   |                       |              | 2, 3               | 0.015  |        |               |
| Line Regulation (Note 2)                        | LN reg            | $V_{IN} = 13V$ 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                  | 30     |        | $\mu V_{p-p}$ |
| Output Voltage Temperature Coefficient (Note 4) | $TCV_O$           |                       | -1           | 1, 2, 3            | -8.5   | 8.5    | ppm/°C        |
|   |                   |                       | -2           |                    | -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**

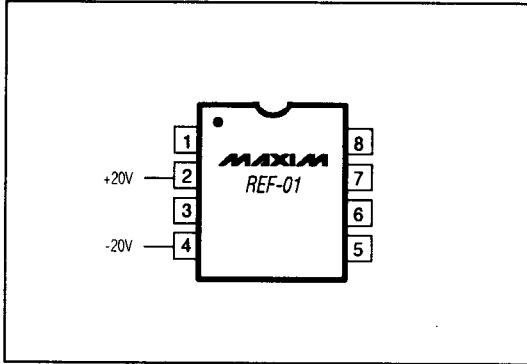
| MIL-STD-883 Test Requirements                                   | Subgroups<br>(per Method 5005, Table 1) |
|---|---|
| Interim Electrical Parameters<br>(Method 5004)                  | 1                                       |
| Final Electrical Parameters<br>(Method 5004)                    | 1,*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

\*PDA applies to Subgroup 1 only.

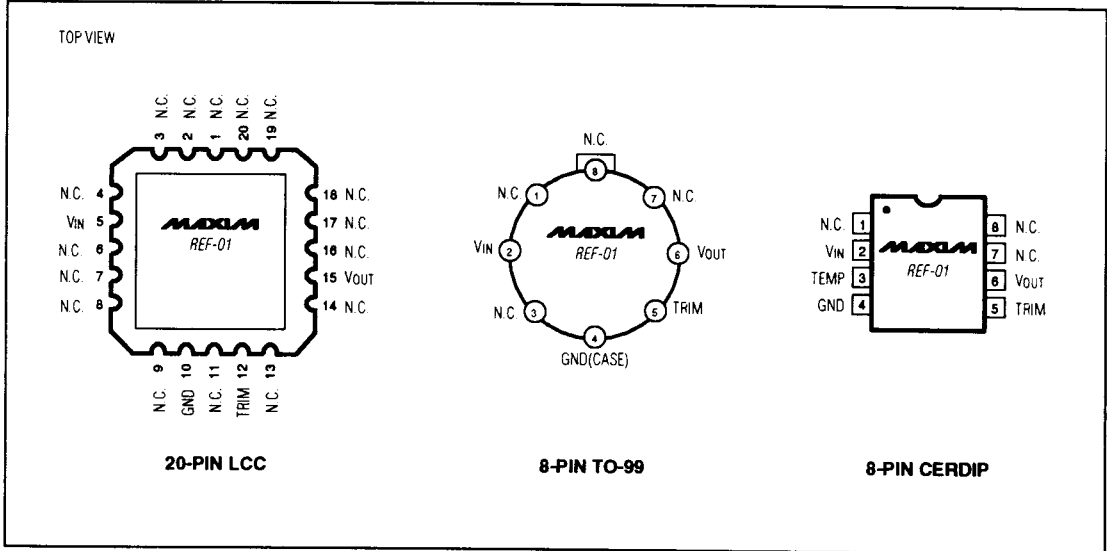
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## 4.0 Life Test/Burn-In Circuit



## 4.1 Pin Configurations



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## 4.2 Simplified Schematic and Pin Connections

