

### 1.0 SCOPE

This specification covers the detail requirements for a precision voltage reference which provides a stable +10V output that can be adjusted over a  $\pm 3\%$  range with minimal effect on temperature stability. Long term stability of the REF-10 is qualified by sample wafer lot testing to a limit of 50ppm/1000 hours maximum.

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

### 1.2 Part Number. The complete part numbers per Table I of this specification follow:

<u>Device</u>	<u>Part Number</u>	<u>Package</u>
A	REF-10AJ/883	J
B	REF-10BJ/883	J

### 1.2.3 Case Outline.

<u>Letter</u>	<u>Case Outline (Lead finish per MIL-M-38510)</u>
J	8-lead metal can (TO-99)

### 1.3 Absolute Maximum Ratings. ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Input Voltage .....	40V
Power Dissipation .....	500mW
Output Short-Circuit Duration (to Ground or $V_{IN}$ ).....	Indefinite
Storage Temperature Range .....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Operating Temperature Range .....	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Lead Temperature (Soldering, 60 sec).....	$+300^\circ\text{C}$
DICE Junction Temperature Range ( $T_J$ ) .....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$

### 1.5 Thermal Characteristics:

Thermal Resistance, TO-99 (J) package:

Junction-to-Case ( $\theta_{JC}$ ) =  $45^\circ\text{C/W MAX}$

Junction-to-Ambient ( $\theta_{JA}$ ) =  $150^\circ\text{C/W MAX}$

TABLE 1

 $V_{IN} = 15V$ ;  $T_A = 25^\circ C$  unless otherwise specified.

Characteristics	Symbol	Special Conditions	REF-10/883				Units
			LIMITS A		LIMITS B		
			Min	Max	Min	Max	
Quiescent Supply Current	$I_{SY}$	No Load	–	1.4	–	1.4	mA
		$-55^\circ C \leq T_A \leq +125^\circ C$	–	2.0	–	2.0	mA
Output Voltage	$V_O$	$I_L = 0$	9.970	10.030	9.950	10.050	V
		$-55^\circ C \leq T_A \leq +125^\circ C$	9.955	10.045	9.905	10.095	V
Output Voltage Temperature Coefficient (Notes 1, 4)	$TCV_O$	$-55^\circ C \leq T_A \leq +125^\circ C$	–	8.5	–	25	ppm/ $^\circ C$
Short-Circuit Current	$I_{SC}$	$V_O = 0$	+15	+60	+15	+60	mA
Sink Current	$I_S$		-0.3	–	-0.3	–	mA
Load Regulation (Note 2)	$LD_{reg}$	$I_L = 0mA$ to 10mA	–	0.008	–	0.010	%/mA
		$I_L = 0mA$ to 8mA $-55^\circ C \leq T_A \leq +125^\circ C$	–	0.012	–	0.015	%/mA
Line Regulation (Note 2)	$LN_{reg}$	$V_{IN} = 13V$ to 33V	–	0.010	–	0.010	%/V
		$-55^\circ C \leq T_A \leq +125^\circ C$	–	0.015	–	0.015	%/V
Load Current (Note 3)	$I_L$		10	–	10	–	mA
Output Adjustment Range	$\Delta V_{trim}$	$R_p = 10k\Omega$	$\pm 3.0$	–	$\pm 3.0$	–	%
Output Voltage Noise (Note 4)	$e_{np-p}$	0.1Hz to 10Hz	–	30	–	30	$\mu V_{p-p}$
Long-Term Stability (Note 5)			–	50	–	50	ppm/ 1kHrs

## NOTES:

$$1. TCVO = ABS \left( \frac{V_{MAX} - V_{MIN}}{10V} \right) \left( \frac{1}{180^\circ C} \right) \left( 10^6 \right) \text{ where } -55^\circ C \leq T_A \leq +125^\circ C.$$

2. Line and Load Regulation specifications include the effect of self-heating.

3. Minimum of 10mA Load Current guaranteed by Load Regulation test.

4. This parameter is 100% tested.

5. Each wafer lot is tested for Long-Term Stability at a chip temperature of  $76^\circ C$  for 168 hours. The sample size is 105 units with an LTPD of 5/2.

**TABLE 2**

REF-10/883

**Electrical Test Requirements  
For Class B Devices**

MIL-STD-883 Test Requirements	Subgroups (see Table 3)
Interim Electrical Parameters (pre Burn-In)	1
Final Electrical Test Parameters	1*, 2, 3, 8
Group A Test Requirements	1, 2, 3, 8

\* PDA applies to Subgroup 1 only.  
No other Subgroups are included in PDA.

**TABLE 3****Group A Inspection** $V_{IN} = 15V$ ;  $T_A = T_J$  unless otherwise specified.

Test Requirement	Symbol	Special Conditions	REF-10/883				Units
			LIMITS A		LIMITS B		
			Min	Max	Min	Max	
<b>Subgroup 1</b>	$I_{SY}$	No Load	--	1.4	--	1.4	mA
$T_A = +25^\circ C$	$\Delta V_{trim}$	$R_p = 10k\Omega$	$\pm 3.0$	--	$\pm 3.0$	--	%
	$V_O$	$I_L = 0$	9.970	10.030	9.950	10.050	V
	$I_{SC}$	$V_O = 0$	+15	+60	+15	+60	mA
	$I_S$		-0.3	--	-0.3	--	mA
	$LD_{reg}$	$I_L = 0mA, 10mA$ (Note 2)	--	0.008	--	0.010	%/mA
	$LN_{reg}$	$V_{IN} = 13V, 33V$ (Note 2)	--	0.010	--	0.010	%/V
	$I_L$	(Note 3)	10	--	10	--	mA
<b>Subgroup 2</b>	$I_{SY}$	No Load	--	2.0	--	2.0	mA
$T_A = +125^\circ C$	$V_O$		9.955	10.045	9.905	10.095	V
	$LD_{reg}$	$I_L = 0mA, 8mA$ (Note 2)	--	0.012	--	0.015	%/mA
	$LN_{reg}$	$V_{IN} = 13V, 33V$ (Note 2)	--	0.015	--	0.015	%/V
<b>Subgroup 3</b>	$I_{SY}$	No Load	--	2.0	--	2.0	mA
$T_A = -55^\circ C$	$V_O$		9.955	10.045	9.905	10.095	V
	$LD_{reg}$	$I_L = 0mA, 8mA$ (Note 2)	--	0.012	--	0.015	%/mA
	$LN_{reg}$	$V_{IN} = 13V, 33V$ (Note 2)	--	0.015	--	0.015	%/V
<b>Subgroup 8</b> $-55^\circ C \leq T_A \leq +125^\circ C$	$TCV_O$	(Notes 1, 4)	--	8.5	--	25	ppm/ $^\circ C$

## NOTES:

$$1. TCV_O = ABS \left( \frac{V_{MAX} - V_{MIN}}{10V} \right) \left( \frac{1}{180^\circ C} \right) \left( 10^6 \right) \text{ where } -55^\circ C \leq T_A \leq +125^\circ C.$$

2. Line and Load Regulation specifications include the effect of self-heating.

3. Minimum of 10mA Load Current guaranteed by Load Regulation test.

4. This parameter is 100% tested.