REVISION RECORD		
REV	DESCRIPTION	DATE
0	INITIAL RELEASE	04/08/08
A	CHANGED PART NUMBER FROM "RH1034-1.2M" TO "RH1034M-1.2" THROUGH OUT SPEC. PAGE 2 – ADD OPTION 2 OF DEVICE IN A TO46 METAL CAN PAGE 3, PARAGRAPH 3.8 – ADD FIGURES 6 & 7, BURN-IN CIRCUITS PAGE 3, PARAGRAPH 3.10.1 – ADD FIGURE 2, CASE OUTLINE PAGE 3, PARAGRAPH 3.11.3 – CHANGE FIGURE 3 TO FIGURE 5, TOTAL DOSE BIAS CIRCUIT PAGE 7, ADD TO46/3 LEAD CASE OUTLINE, FIGUE 2 PAGE 8, TERMINAL CONNECTIONS FOR CERPAC – CHANGE FIGURE FROM 2 TO 3 AND ADDED TERMINAL CONNECTIONS FOR TO46, FIGURE 4 PAGE 9, TOTAL DOSE BIAS CIRCUIT – CHANGE FIGURE FROM 3 TO 5 PAGE 10, STATIC BURN-IN CIRCUIT FOR FLATPACK FROM 4 TO 6 PAGE 11 ADDED - ADD STATIC BURN-IN CIRCUIT FOR TO46 PAGES 12 AND 13 ADDED – WERE ORIGINALLY PAGES 10 AND 11 PAGE 12 – ALL RAD MIN, MAX LIMITS AMENDED.	07/08/09
B	PAGE 12, TABLE 2: ELECTRICAL CHARACTERISTICS (Postirradiation) T_A = 25°C – CHANGED VZ, Reverse Breakdown Voltage: 10K RAD to MIN 1.202, MAX 1.305 V; 20K RAD to MIN 1.202, MAX 1.315 V; 50K RAD to MIN 1.202, MAX 1.325 V; 100K RAD to MIN 1.202, MAX 1.340 V; 200K RAD to MIN 1.202, MAX 1.370 V	
C	**PAGE 8, FIGURE 4, TERMINAL CONNECTIONS FOR H PACKAGE TO46 / 3 LEAD METAL CAN, UPDATED FIGURE.**	

REVISION RECORD AND DESCRIPTION CONTINUED ON NEXT PAGE.

CAUTION: ELECTROSTATIC DISCHARGE SENSITIVE PART

REVISION	PAGE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13				
INDEX	REVISION	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**				
REVISION	PAGE NO.																	
INDEX	REVISION																	

				LINEAR TECHNOLOGY CORPORATION MILPITAS, CALIFORNIA	
	ORIG			TITLE:	
	DSGN			**MICROCIRCUIT, LINEAR, RH1034M-1.2 MICROPOWER DUAL REFERENCE**	
	ENGR				
	MFG				
	CM				
	QA			SIZE	CAGE CODE / DRAWING NUMBER / REV
	PROG				**64155** / **05-08-5229** / **C**
APPLICATION	FUNCT	SIGNOFFS	DATE	CONTRACT:	

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1.0 SCOPE:

1.1 This specification defines the performance and test requirements for a microcircuit processed to a space level manufacturing flow.

2.0 APPLICABLE DOCUMENTS:

2.1 Government Specifications and Standards: the following documents listed in the Department of Defense Index of Specifications and Standards, of the issue in effect on the date of solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS:

MIL-PRF-38535	Integrated Circuits (Microcircuits) Manufacturing, General Specification for
MIL-STD-883	Test Method and Procedures for Microcircuits
MIL-STD-1835	Microcircuits Case Outlines

2.2 Order of Precedence: In the event of a conflict between the documents referenced herein and the contents of this specification, the order of precedence shall be this specification, MIL-PRF-38535 and other referenced specifications.

3.0 REQUIREMENTS:

3.1 General Description: This specification details the requirements for the RH1034M-1.2 REFERENCE processed to space level manufacturing flow.

3.2 Part Number:

3.2.1 Option 1 – RH1034MW-1.2 (Glass Sealed Flatpack, 10 Leads)

3.2.2 Option 2 – RH1034MH-1.2 (TO46 Metal Can, 3 Leads)

3.3 Part Marking Includes:

a. LTC Logo

b. LTC Part Number (See Paragraph 3.2)

c. Date Code

d. Serial Number

e. ESD Identifier per MIL-PRF-38535, Appendix A

3.4 The Absolute Maximum Ratings:
(Note1)

Operating Current	20mA
Forward Current	20mA
Operating Temperature Range	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 sec)	+300°C

3.5 Electrostatic discharge sensitivity, ESDS, shall be Class 1.

3.6 Electrical Performance Characteristics: The electrical performance characteristics shall be as specified in Table I and Table II.

3.7 Electrical Test Requirements: Screening requirements shall be in accordance with 4.1 herein, MIL-STD-883, Method 5004, and as specified in Table IV herein.

3.8 Burn-In Requirement: Burn-in circuit is specified in Figure 6 and 7.

3.9 Delta Limit Requirement: Delta limit parameters are specified in Table III herein, are calculated after each burn-in, and the delta rejects are included in the PDA calculation.

3.10 Design, Construction, and Physical Dimensions: Detail design, construction, physical dimensions, and electrical requirements shall be specified herein.

3.10.1 Mechanical / Packaging Requirements: Case outlines and dimensions are in accordance with Figure 1.

3.10.2 Terminal Connections: The terminal connections shall be as specified in Figure 3 and 4.

3.10.3 Lead Material and Finish: The lead material and finish for Option 1 shall be Alloy 42 for Flatpack with lead finish hot solder dip (Finish litter A) in accordance with MIL-PRF-38535. The lead material and finish for Option 2 shall be gold plated Kovar.

3.11 Radiation Hardness Assurance (RHA):

3.11.1 The manufacturer shall perform a lot sample test as an internal process monitor for total dose radiation tolerance. The sample test is performed with MIL-STD-883 TM1019 Condition A as a guideline.

3.11.2 For guaranteed radiation performance to MIL-STD-883, Method 1019, total dose irradiation, the manufacturer will provide certified RAD testing and report through an independent test laboratory when required as a customer purchase order line item.

3.11.3 Total dose bias circuit is specified in Figure 5.

3.12 Wafer Lot Acceptance: Wafer lot acceptance shall be in accordance with MIL-PRF-38535, Appendix A, except for the following: Topside glassivation thickness shall be a minimum of 4KÅ.

3.13 Wafer Lot Acceptance Report: SEM is performed per MIL-STD-883, Method 2018 and copies of SEM photographs shall be supplied with the Wafer Lot Acceptance Report as part of a Space Data Pack when specified as a customer purchase order line item.

4.0 VERIFICATION (QUALITY ASSURANCE PROVISIONS)

4.1 Quality Assurance Provisions: Quality Assurance provisions shall be in accordance with MIL-PRF-38535. Linear Technology is a QML certified company and all Rad Hard candidates are assembled on qualified Class S manufacturing lines.

4.2 Sampling and Inspection: Sampling and Inspection shall be in accordance with MIL-STD-883, Method 5005 with QML allowed and TRB approved deviations in conjunction with paragraphs 3.1.1, 3.2.1, and **3.4** of the test method.

4.3 Screening: Screening requirements shall be in accordance with MIL-STD-883, Method 5004 with QML allowed and TRB approved deviations in conjunction with paragraphs **3.1, 3.1.1,** and **3.4** of the test method. Electrical testing shall be as specified in Table IV herein.

4.3.1 Analysis of catastrophic (open/short) failures from burn-in will be conducted only when a lot fails the burn-in or re-burn-in PDA requirements.

4.4 Quality Conformance Inspection: Quality conformance inspection shall be in accordance with 4.2 and 4.3 herein and as follows:

4.4.1 Group A Inspection: Group A inspection shall be performed in accordance with 4.1 herein, per MIL-STD-883, Method 5005, and specified in Table IV herein.

4.4.2 Group B Inspection: When purchased, a full Group B is performed on an inspection lot. As a minimum, Subgroup B2 (Resistance to Solvents / Mark Permanency) and Subgroup B3 (Solderability) are performed prior to the first shipment from any inspection lot and Attributes provided when a Full Space Data Pack is ordered. Subgroup B5 (Operating Life) is performed on each wafer lot. This subgroup may or may not be from devices built in the same package style as the current inspection lot. Attributes and variables data for this subgroup will be provided upon request at no charge.

4.4.2.1

Group B, Subgroup 2c = 10%	Group B, Subgroup 5 = *5% (*per wafer or inspection lot whichever is the larger quantity)
Group B, Subgroup 3 = 10%	
Group B, Subgroup 4 = 5%	Group B, subgroup 6 = 15%

4.4.2.2 All footnotes pertaining to Table IIa in MIL-STD-883, Method 5005 apply. The quantity (accept number) of all other subgroups are per MIL-STD-883, Method 5005, Table IIa.

4.4.3 Group D Inspection: When purchased, a full Group D is performed on an inspection lot. As a minimum, periodic full Group D sampling is performed on each package family for each assembly location every 26 weeks. A generic Group D Summary is provided when a full Space Data Pack is ordered.

4.4.3.1 Group D, Subgroups 3, 4 and 5 = 15% each (Sample Size Series).

4.4.3.2 All footnotes pertaining to Table IV in MIL-STD-883, Method 5005 apply. The quantity (accept number) or sample number and accept number of all other subgroups are per MIL-STD-883, Method 5005, Table IV.

4.5 Source Inspection:

4.5.1 The manufacturer will coordinate Source Inspection at wafer lot acceptance and pre-seal internal visual.

4.5.2 The procuring activity has the right to perform source inspection at the supplier's facility prior to shipment for each lot of deliverables when specified as a customer purchase order line item. This may include wafer lot acceptance and final data review.

4.6 Deliverable Data: Deliverable data that will ship with devices when a Space Data Pack is ordered:

4.6.1 Lot Serial Number Sheets identifying all devices accepted through final inspection by serial number.

4.6.2 100% attributes (completed lot specific traveler; includes Group A Summary)

4.6.3 Burn-In Variables Data and Deltas (if applicable)

4.6.4 Group B2, B3, and B5 Attributes (Variables data, if performed on lot shipping)

4.6.5 Generic Group D data (4.4.3 herein)

4.6.6 SEM photographs (3.13 herein)

4.6.7 Wafer Lot Acceptance Report (3.13 herein)

4.6.8 X-Ray Negatives and Radiographic Report

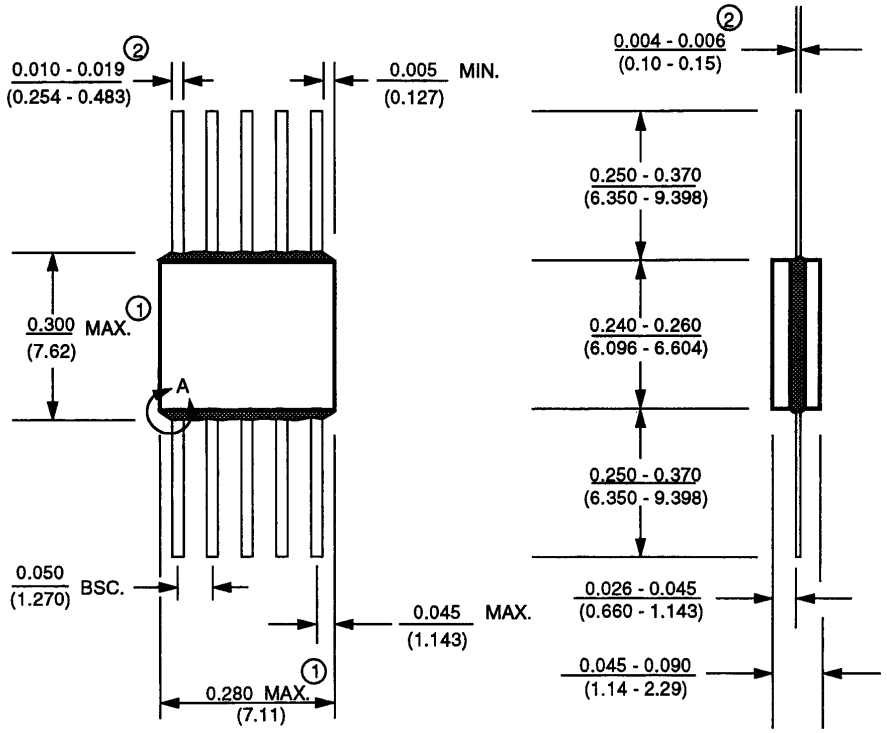
4.6.9 A copy of outside test laboratory radiation report if ordered

4.6.10 Certificate of Conformance certifying that the devices meet all the requirements of this specification and have successfully completed the mandatory tests and inspections herein.

Note: Items 4.6.1 and 4.6.10 will be delivered as a minimum, with each shipment. This is noted on the Purchase Order Review Form as "No Charge Data".

5.0 Packaging Requirements: Packaging shall be in accordance with Appendix A of MIL-PRF-38535. All devices shall be packaged in conductive material or packaged in anti-static material with an external conductive field shielding barrier.

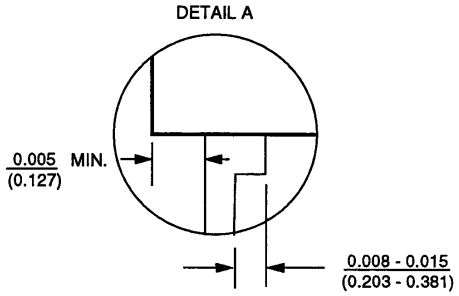
(W10) GLASS SEALED FLATPACK / 10LEADS CASE OUTLINE



NOTES:

① THIS DIMENSION ALLOWS FOR OFF-CENTER LID, MENISCUS AND GLASS OVER RUN

② INCREASE DIMENSIONS BY 0.003 INCH WHEN LEAD FINISH IS APPLIED (SOLDER DIPPED)

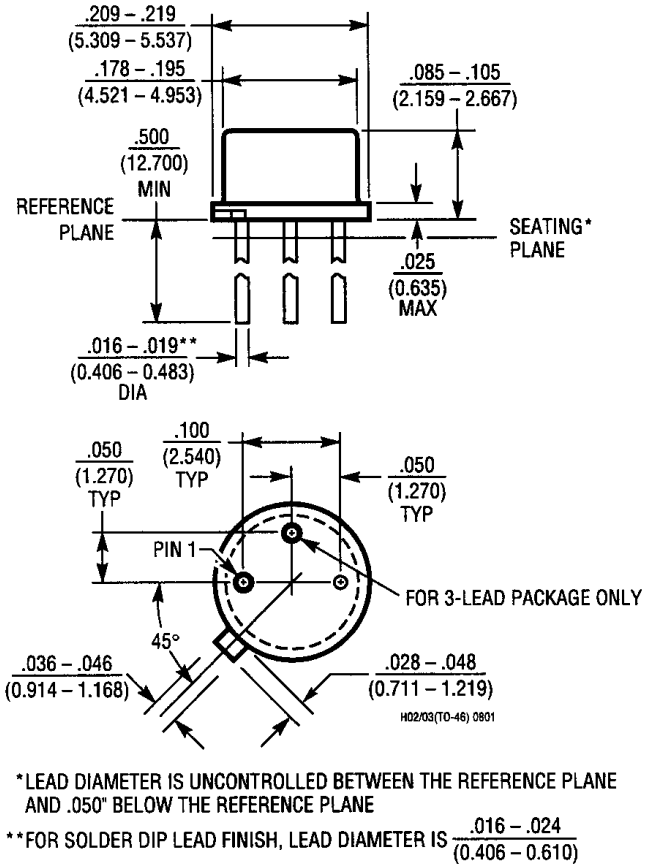


θja = +170°C/W

θjc = +40°C/W

FIGURE 1

(H) TO46 / 3 LEADS CASE OUTLINE



θ_{ja} = +440°C/W
θ_{jc} = +80°C/W
Tj Max = +150°C

FIGURE 2

TERMINAL CONNECTIONS

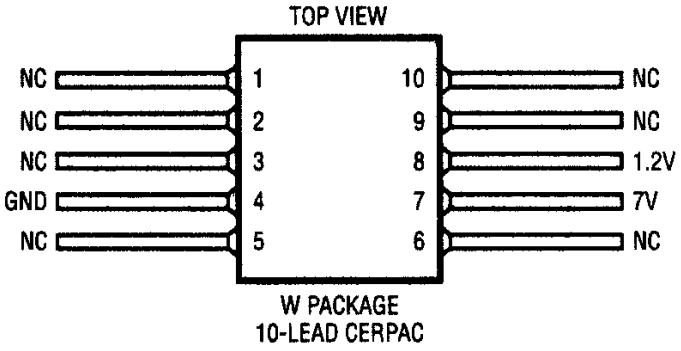


FIGURE 3

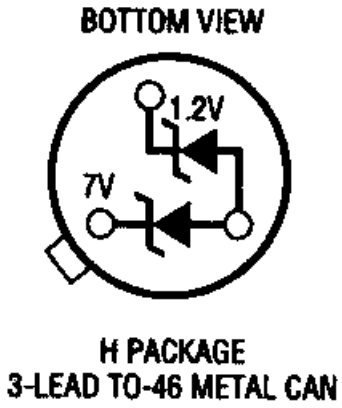


FIGURE 4

TOTAL DOSE BIAS CIRCUIT

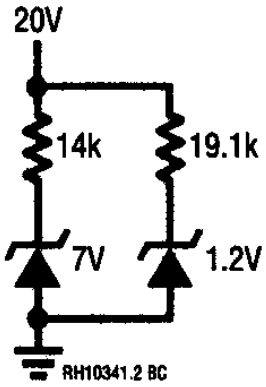
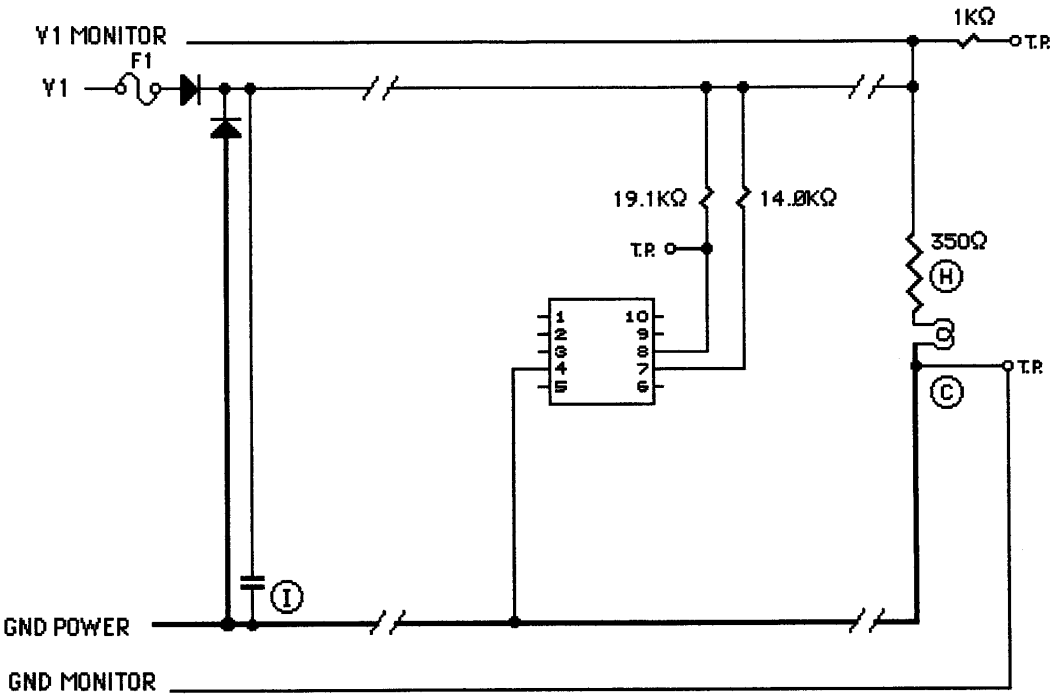
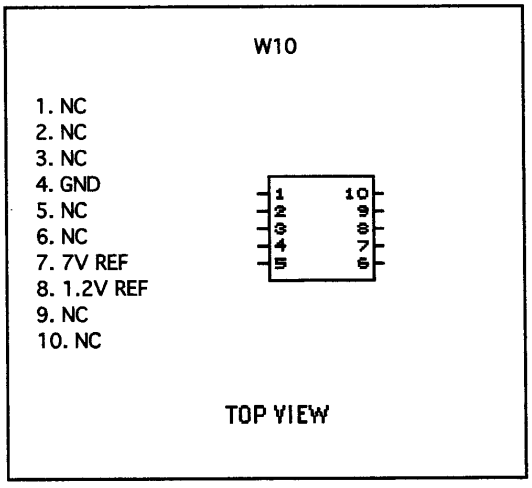


FIGURE 5

STATIC BURN-IN CIRCUIT
OPTION 1, GLASS SEALED FLATPACK / 10 LEAD



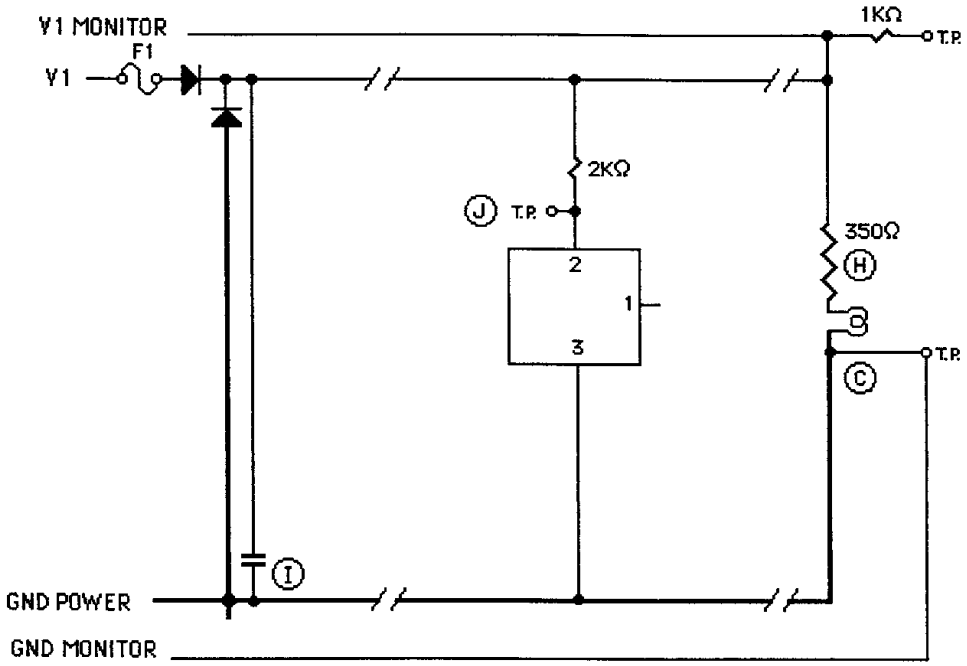
NOTES:
1. Unless otherwise specified, component tolerances shall be per military specification.
2. Tj = 160°C maximum.
3. Ta = 150°C.
4. Burn-in Voltages: V1 = +20V to +22V



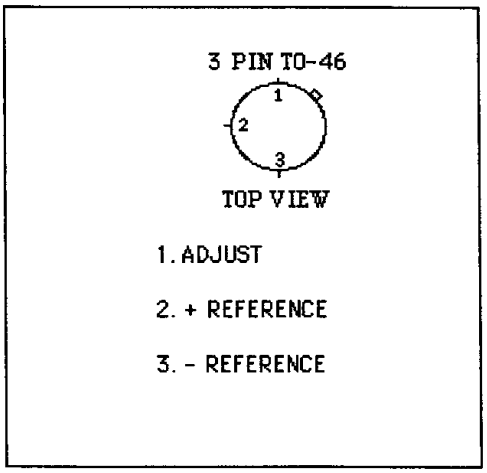
PACKAGE AND PINOUT

FIGURE 6

STATIC BURN-IN CIRCUIT
OPTION 2, TO46 METAL CAN / 3 LEAD



NOTES:
1. Unless otherwise specified, component tolerances shall be per military specification.
2. Tj = 169 °C maximum.
3. Ta = 150 °C.
4. Burn-in Voltages: V1 = +20V to +22V



PACKAGE AND PINOUT

FIGURE 7

TABLE I: ELECTRICAL CHARACTERISTICS (PRE-IRRADIATION) NOTE 3

SYMBOL	PARAMETER	CONDITIONS	NOTES	T_A = 25°C MIN	TYP	MAX	SUB-GROUP	−55°C ≤ T_A ≤ 125°C MIN	TYP	MAX	SUB-GROUP	UNITS
1.2V Reference												
V_Z	Reverse Breakdown Voltage	I_R = 100µA		1.210		1.240	1	1.195		1.255	2, 3	V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	20µA ≤ I_R ≤ 2mA 2mA ≤ I_R ≤ 20mA				2.0 8.0	1 1			4.0 15.0	2, 3 2, 3	mV mV
	Minimum Operating Current					20	1			30	2, 3	µA
	Temperature Coefficient	I_R = 100µA				60	1			60	2, 3	ppm/°C
rz	Reverse Dynamic Impedance	I_R = 100µA	3			1.0	1			2.0	2, 3	Ω
	Low Frequency Noise	I_R = 100µA, 0.1Hz ≤ f ≤ 10Hz			4							μV_{P-P}
	Long-Term Stability	I_R = 100µA			20							ppm/√kHrs
7V Reference												
V_Z	Reverse Breakdown Voltage	I_R = 100µA		6.70		7.30	1	6.60		7.40	2, 3	V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	100µA ≤ I_R ≤ 1mA 1mA ≤ I_R ≤ 20mA				140 250	1 1			190 350	2, 3 2, 3	mV mV
	Temperature Coefficient	I_R = 100µA			60							ppm/°C
	Long-Term Stability	I_R = 100µA			20							ppm/√kHrs

TABLE II: ELECTRICAL CHARACTERISTICS (POST-IRRADIATION) NOTE 3

T_A = 25°C

SYMBOL	PARAMETER	CONDTIONS	NOTES	10KRAD(Si) MIN	MAX	20KRAD(Si) MIN	MAX	50KRAD(Si) MIN	MAX	100KRAD(Si) MIN	MAX	200KRAD(Si) MIN	MAX	UNITS
1.2V Reference														
V_Z	Reverse Breakdown Voltage	I_R = 100µA		1.202	1.305	1.202	1.315	1.202	1.325	1.202	1.340	1.202	1.370	V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	20µA ≤ I_R ≤ 2mA 2mA ≤ I_R ≤ 20mA			7.0 15.0		7.5 16.5		8.5 18.5		10.0 22.5		12.5 30.5	mV mV
rz	Reverse Dynamic Impedance	I_R = 100µA	3		3.5		3.75		4.25		5.0		6.25	Ω
7V Reference														
V_Z	Reverse Breakdown Voltage	I_R = 100µA		6.686	7.314	6.686	7.314	6.686	7.314	6.686	7.324	6.686	7.334	V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Voltage Change with Current	100µA ≤ I_R ≤ 1mA 1mA ≤ I_R ≤ 20mA			175 300		175 300		175 300		175 300		175 300	mV mV

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: Forward biasing either diode will affect the operation of the other diode.

Note 3: This parameter guaranteed by "reverse breakdown voltage change with current" test.

TABLE III: POST BURN-IN ENDPOINTS AND DELTA LIMIT REQUIREMENTS

T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	ENDPOINTS LIMITS MIN	ENDPOINTS LIMITS MAX	DELTA LIMITS MIN	DELTA LIMITS MAX	UNITS
V_Z	Reverse Breakdown Voltage	I_R = 100µA	1.210	1.240	–0.003	0.003	V

TABLE IV: ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
FINAL ELECTRICAL TEST REQUIREMENTS (METHOD 5004)	1*, 2, 3
GROUP A TEST REQUIREMENTS (METHOD 5005)	1*, 2, 3
GROUP B AND D FOR CLASS S ENDPOINT ELECTRICAL PARAMETERS (METHOD 5005)	1, 2, 3

*PDA APPLIES TO SUBGROUP 1.

PDA TEST NOTE: The PDA is specified as 5% based on failures from Group A, Subgroup 1, tests after cool down as the final electrical test in accordance with method 5004 of MIL-STD-883. The verified failures of Group A, Subgroup 1 and delta rejects after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent for the lot.