

The documentation and process conversion measures necessary to comply with this revision shall be completed by 18 January 2005.

INCH POUND

MIL-PRF-19500/437E  
18 October 2004  
SUPERSEDING  
MIL-PRF-19500/437D  
15 September 1997

## PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, LOW-NOISE VOLTAGE REGULATOR TYPES,  
1N5518B-1, 1N5518C-1, 1N5518D-1 THROUGH 1N5546B-1, 1N5546C-1, 1N5546D-1,  
1N5518BUR-1, 1N5518CUR-1, 1N5518DUR-1 THROUGH 1N5546BUR-1, 1N5546CUR-1, 1N5546DUR-1  
JAN, JANTX, JANTXV, JANHC, AND JANKC

This specification is approved for use by all Departments  
and Agencies of the Department of Defense.

- \* The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19500.

### 1. SCOPE

1.1 Scope. This specification covers the performance requirements for 500 milliwatt, silicon, low-noise, voltage regulator diodes with voltage tolerances of 5 percent, 2 percent, and 1 percent. Three levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500, and two levels of product assurance for each unencapsulated device type die. For JANHC and JANKC quality levels (see 6.5).

1.2 Physical dimensions. See figures 1 (DO-7 and DO-35), 2 (DO-213AA), and 3 (JANHC and JANKC).

- \* 1.3 Maximum ratings. Maximum ratings are shown in 3.8 herein and as follows:

- a.  $P_T = 500 \text{ mW}$  (DO-7 and D0-35) at  $T_L = +50^\circ\text{C}$ ,  $L = .375 \text{ inch}$  (9.53 mm); both ends of case or diode body to heat sink at  $L = .375 \text{ inch}$  (9.53 mm). (Derate  $I_Z$  to 0.0 mA dc at  $+175^\circ\text{C}$ ).
- b.  $P_T = 500 \text{ mW}$  (D0-213AA) at  $T_{EC} = +125^\circ\text{C}$ . (Derate to 0 at  $+175^\circ\text{C}$ ).
- c.  $-65^\circ\text{C} \leq T_J \leq +175^\circ\text{C}$ ;  $-65^\circ\text{C} \leq T_{STG} \leq +175^\circ\text{C}$ .

- \* 1.4 Primary electrical characteristics. Primary electrical characteristic see 3.8 herein and as follows:

- a.  $3.3 \text{ V dc} \leq V_Z \leq 33 \text{ V dc}$ .
- b.  $R_{\theta JL} = 250^\circ\text{C/W}$  (maximum) at  $L = .375 \text{ inch}$  (9.53 mm) (D0-7 and D0-35).
- c.  $R_{\theta JEC} = 100^\circ\text{C/W}$  (maximum) junction to end-caps (D0-213AA).
- d. For derating see figures 4 and 5.

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to [Semiconductor@dscclia.mil](mailto:Semiconductor@dscclia.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://www.dodssp.daps.mil>.

## 2. APPLICABLE DOCUMENTS

\* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

### 2.2 Government documents.

\* 2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### \* DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

#### \* DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-750 - Test Methods for Semiconductor Devices.

\* (Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

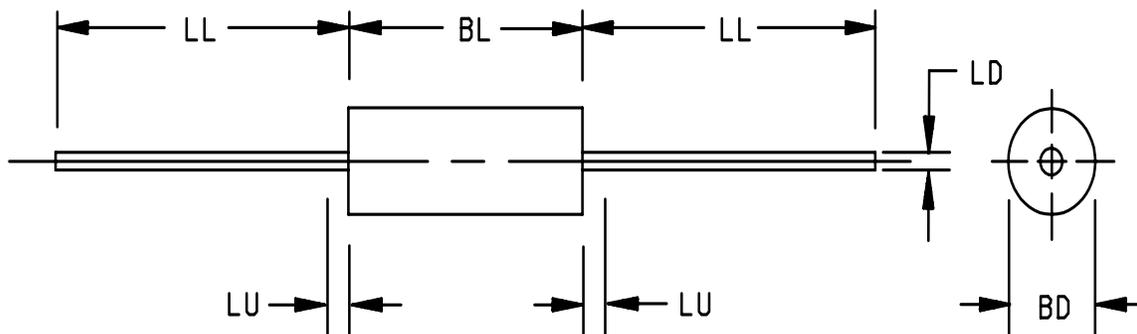
## 3. REQUIREMENTS

\* 3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

C-..... 2 percent voltage tolerance devices.  
D-..... 1 percent voltage tolerance devices.  
JANH..... High reliability product assurance level for unencapsulated devices.  
JANK..... Space reliability product assurance level for unencapsulated devices.  
UR..... Unleaded or surface mounted diodes with round end-caps.

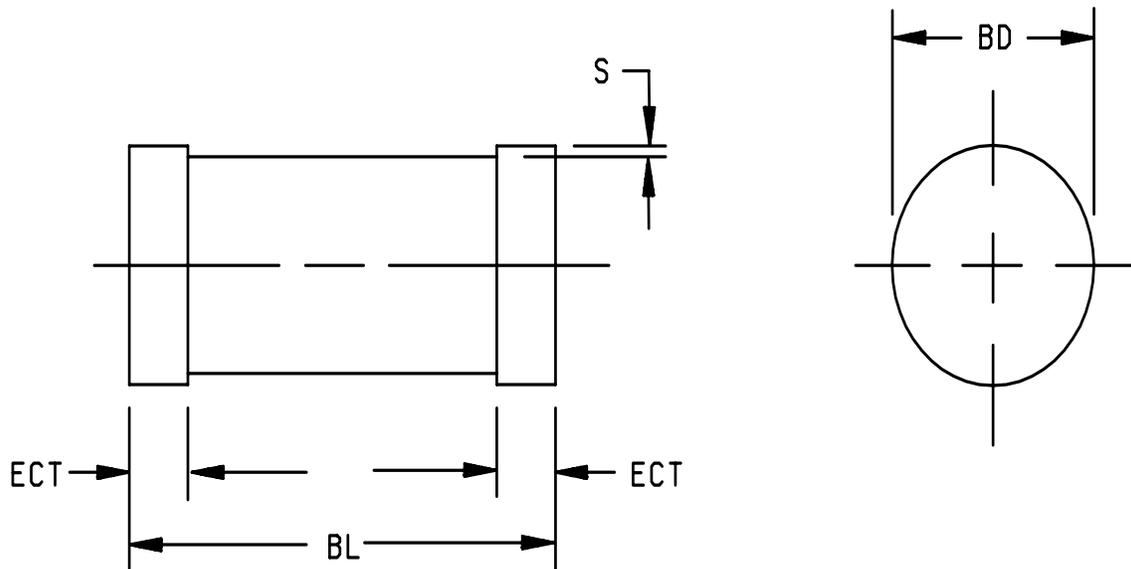


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.055	.107	1.40	2.72	3
BL	.120	.300	3.05	7.62	3
LD	.018	.022	0.46	0.56	
LL	1.000	1.500	25.40	38.10	
LU		.050		1.27	4

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of BD.
4. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.
5. For DO-7 packages (see 3.4.1).
6. Dimensioning and tolerancing shall be in accordance with ASME Y14.5M.

FIGURE 1. Physical dimensions types 1N5518B-1, C-1, and D-1 through 1N5546B-1, C-1, D-1 (DO-7 and DO-35).

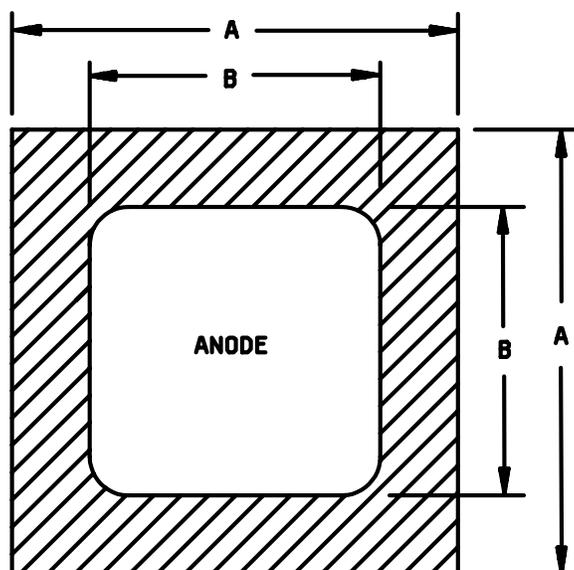


Ltr	Dimensions			
	Inches		Millimeter	
	Min	Max	Min	Max
BD	.063	.067	1.60	1.70
BL	.130	.146	3.30	3.71
ECT	.016	.022	0.41	0.56
S	.001 min		0.03 min	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Dimensioning and tolerancing shall be in accordance with ASME Y14.5M.

FIGURE 2. Physical dimensions 1N5518BUR-1, CUR-1, and DUR-1 through 1N5546BUR-1, CUR-1, DUR-1 (DO-213AA).



**BACKSIDE IS CATHODE**

Ltr	JANHCA and JANKCA die dimensions				Ltr	JANHCB and JANKCB die dimensions			
	Inche		Millimeters			Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	.021	.025	0.53	0.64	A	.024	.028	0.61	0.71
B	.013	.017	0.33	0.43	B	.017	.021	0.43	0.53

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The JANHCA and JANKCA die thickness is .010 inch (0.25 mm)  $\pm$ .002 inches (0.05 mm). Anode metallization: Al, thickness = 25,000 Å minimum; cathode metallization: Thickness = 4,000 Å minimum.
4. The JANHCB and JANKCB die thickness is .010 inch (0.25 mm)  $\pm$ .002 inch (0.05 mm). Anode metallization: Al, thickness = 40,000 Å minimum; cathode metallization: Au, thickness = 5,000 Å minimum.
5. Circuit layout data: For zener operation, cathode must be operated positive with respect to anode.
6. Requirements in accordance with appendix G, MIL-PRF-19500, are performed in a TO-5 package (see 6.5).
7. Dimensioning and tolerancing shall be in accordance with ASME Y14.5M.

FIGURE 3. Physical dimensions JANHC and JANKC die.

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 (DO-7 and DO-35), 2 (DO-213AA), and 3 (JANHC and JANKC) herein.

\* 3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

\* 3.4.2 Diode construction. All devices shall be in accordance with the requirements of MIL-PRF-19500.

\* 3.4.2.1 Dash one construction. Dash one (-1) diodes shall be of metallurgically bonded double plug construction or straight through construction in accordance with the requirements of category I, II, or III (see MIL-PRF-19500).

3.4.3 Package outlines. This specification contains two standard packages; DO-7 and DO-35. Any user of this specification that has a specific package outline requirement shall specify their preference in the acquisition order. If package style is not specified, the manufacturer may supply either package.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500.

\* 3.5.1 Polarity. The polarity shall be indicated with a contrasting color band to denote the cathode end. Alternately, for surface mount (UR) devices, a minimum of three evenly spaced contrasting color dots around the periphery of the cathode end may be used. No color coding will be permitted.

3.5.2 DO-7 package. All DO-7 package devices shall be marked with a "D7" on the device within the marking area.

\* 3.5.3 Marking of UR suffix version devices. For UR suffix (surface mount) devices only, all marking (except polarity) may be omitted from the body of the device, but shall be retained on the initial container.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.6.1 Selection of tight tolerance devices. The C and D suffix devices shall be selected from JAN, JANTX, or JANTXV devices which have successfully completed all applicable screening, and table I and groups B, and C testing as 5 percent tolerance devices. All sublots of C and D suffix devices shall pass table I, subgroup 2 at the tightened tolerances. The  $T_L$  or  $T_{EC}$  for C and D suffix devices shall be maintained at  $30^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for  $V_Z$  correlation on tight tolerances.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2, 4.4.3 and tables II and III.

\* 3.8 Maximum and primary test ratings. Maximum test ratings for voltage regulator diodes are specified in table IV, columns 3, 4 and 10 herein. Primary electrical characteristics are in columns 1, 6, 8 and 9.

3.9 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

#### 4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).
- c. Conformance inspection (see 4.4).

\* 4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.2.1 Alternate qualification. For alternate qualification (see 4.5.4).

4.2.2 JANHC and JANKC devices. JANHC and JANKC devices shall be qualified in accordance with appendix G, of MIL-PRF-19500.

4.2.3 Sampling and inspection. Lot accumulation is 6 months in lieu of 6 weeks.

\* 4.3 Screening (JANTX and JANTXV levels only). Screening shall be in accordance with appendix E, table IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screening, appendix E, table IV of MIL-PRF-19500	Measurement	
	JANTX and JANTXV levels	JAN level
3a	Temperature cycling	Temperature cycling in accordance with MIL-PRF-19500, JANTX level.
(1) 3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
7a 7b	Not applicable Optional	Not applicable Not applicable
9	Not applicable	Not applicable
11	$I_{R1}$ and $V_Z$	Not applicable
12	See 4.3.3, $t = 48$ hours	Not applicable
(2) 13	$\Delta I_{R1} \leq 100$ percent of initial reading' or 10 nA dc, whichever is greater; $\Delta V_Z \leq \pm 2$ percent of initial reading subgroup 2 of table I herein.	Not applicable
14a 14b	Not applicable Required	Not required Not required
15	Not required	Not required
16	Not required	Not required

(1) Thermal impedance may be performed any time after sealing provided temperature cycling is performed in accordance with MIL-PRF-19500, screen 3 prior to this thermal test.

(2) PDA = 5 percent for screen 13, applies to  $\Delta I_{R1}$  and  $\Delta V_Z$ . Thermal impedance ( $Z_{\theta JX}$ ) is not required in screen 13.

4.3.1 Screening (JANHC and JANKC). Screening of JANHC and JANKC die shall be in accordance with MIL-PRF-19500, appendix G.

4.3.2 Thermal impedance ( $Z_{\theta JX}$  measurements). The  $Z_{\theta JX}$  measurements shall be performed in accordance with method 3101 of MIL-STD-750. The maximum limit for  $Z_{\theta JX}$  in screening (appendix E, table IV of MIL-PRF-19500) shall be derived by each vendor by means of process control (not to exceed the table I, subgroup 2 limits)

- a.  $I_M$  measurement current..... 1 mA to 10 mA.
- b.  $I_H$  forward heating current ..... 0.5 A to 1.0 A.
- c.  $t_H$  heating time..... 10 ms.
- d.  $t_{MD}$  measurement delay time ..... 70  $\mu$ s maximum.

\* 4.3.3 Power burn-in conditions. Power burn-in conditions are as follows:  $I_{ZM}$  = column 10 of table IV;  $T_A$  shall be room ambient in accordance with MIL-STD-750, section 4.5. Mounting and test conditions in accordance with method 1038 of MIL-STD-750, condition B. Adjust  $I_Z$  or  $T_A$  to achieve the required  $T_J$ . Use method 3100 of MIL-STD 750 to measure  $T_J$ .  $T_J$  = 125°C minimum.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500.

\* 4.4.1 Alternate conformance inspection. Alternate conformance inspection, see MIL-PRF-19500.

4.4.2 Group A inspection. Group A inspection shall be conducted in accordance with appendix E, table V, of MIL-PRF-19500, and table I herein.

4.4.3 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VIb (JANTXV and JANTX) of MIL-PRF-19500, and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with table III herein.

\* 4.4.3.1 Group B inspection, appendix E, table VIb of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B2	1056	0°C to +100°C, 10 cycles.
B2	1051	-55°C to +175°C, 25 cycles.
B3	1027	$I_{ZM}$ = 50 percent of column 10 of table IV (minimum). Adjust $I_Z$ or $T_A$ to ensure a $T_J$ = +150°C (min).
B5		Not applicable
B6	1032	$T_A$ = +175°C.

4.4.4 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VII of MIL-PRF-19500 and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with table III herein.

\* 4.4.4.1 Group C inspection, appendix E, table VII of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
C2	1056	0°C to +100°C, 10 cycles.
C2	1051	-55°C to +175°C, 20 cycles.
C2	2036	Test condition A; 4 pounds; t = 15 seconds. Not applicable to U suffix devices.
	2036	Test condition E, (not applicable for "U" suffix devices).
C2	1071	Test condition E.
C3		Not applicable.
C5	3101 or 4081	See 4.5.4
C6	1026	$I_{ZM}$ = 50 percent of column 10 of table IV (minimum). Adjust $I_Z$ or $T_A$ to ensure a $T_J = +150^\circ\text{C}$ (min).
C8	4071	$I_Z$ = column 11 of table IV, $T_1 = +25^\circ\text{C} \pm 5^\circ\text{C}$ , $T_2 = +125^\circ\text{C} \pm 5^\circ\text{C}$ , $\infty V_Z$ = column 8 of table IV, sampling plan = 22 devices, c = 0.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IX of MIL-PRF-19500 and table II herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Surge current ( $I_{ZSM}$ ). The peak currents shown in column 4 of table IV shall be applied in the reverse direction and these shall be superimposed on the current ( $I_Z$  = column 11 of table IV) a total of 5 surges at 1 minute intervals. Each individual surge shall be one-half square-wave-pulse of 8.3 ms duration or an equivalent one-half sinewave with the same effective rms current.

4.5.2 Regulator voltage measurements. The test current shall be applied until thermal equilibrium is attained ( $20 \pm 2$  seconds) prior to reading the breakdown voltage. For this test, the diode shall be suspended by its leads with mounting clips whose inside edge is located at .375 inch (9.53 mm) from the body and the mounting clips shall be maintained at a temperature of  $+25^\circ\text{C} + 8^\circ\text{C}$ ,  $-2^\circ\text{C}$ . This measurement may be performed after a shorter time following application of the test current than that which provides thermal equilibrium if correlation to stabilized readings can be established to the satisfaction of the Government.

4.5.3 Temperature coefficient of regulator voltage ( $\infty V_Z$ ). The device shall be temperature stabilized with current applied prior to reading regulator voltage at the specified ambient temperature as specified in 4.4.4.1, subgroup C7.

4.5.4 Thermal impedance for initial qualification or requalification. Read and record data ( $Z_{\theta JX}$ ) shall be supplied to the qualifying activity on one lot (random sample of 500 devices minimum). Twenty-two serialized devices shall be sent to the qualifying activity for test correlation.

\* 4.5.5 Thermal resistance. Thermal resistance measurement shall be in accordance with method 3101 or 4081 of MIL-STD-750. Forced moving air or draft shall not be permitted across the device during test. The maximum limit for  $R_{\theta JL}$  under these test conditions shall be  $R_{\theta JL}$  (maximum) = 250°C/W;  $R_{\theta JEC}$  (maximum) = 100°C/W. The following conditions shall apply when using method 3101 or 4081:

- a.  $I_M$ ..... 1 mA to 10 mA.
- b.  $I_H$ ..... 200 mA to 400 mA.
- c.  $t_H$ ..... 25 seconds minimum.
- d.  $t_{MD}$ ..... 70  $\mu$ s maximum.

LS = lead spacing = .375 inch (9.53 mm) as defined on figure 6, 0 inch (0.00 mm) lead spacing for surface mount devices.

\* 4.5.6 Decap internal visual scribe and break. Scratch glass at cavity area with diamond scribe. Carefully snap open. Using 30X magnification examine the area where die (or bonding material) are in contact with the plugs, verify metallurgical bonding area. If the verification of the metallurgical bonding area is in question with test method 3101 and test condition limits herein,  $Z_{\theta JX}$ , shall be used to determine suitability for use.

4.5.7 Noise density. Noise density shall be measured using a noise density test circuit as shown on figure 7. Place a low-noise resistor, equivalent in value to the dynamic impedance of the diode under test, in the test clips and adjust test current ( $I_{ZT}$ ) and measure output-noise voltage. Remove resistor, insert diode under test in test clips, readjust test current to 250  $\mu$ A dc and measure output-noise voltage again. To obtain noise density ( $N_D$ ), subtract rms resistor output-noise voltage from rms diode output-noise voltage and divide by product of overall system gain and square root of bandwidth. All measurements shall be made at +25°C.

4.5.8 Regulation factor. Breakdown voltage shall be measured at a low current,  $I_{ZL}$  as shown in column 13 of table IV. This voltage shall be subtracted from the breakdown voltage measured at  $I_Z$  in column 11 of table IV. The difference is the regulation factor ( $\Delta V_Z$ ) and shall be less than the maximum value shown in column 12 of table IV.

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\* TABLE I. Group A inspection.

Inspection <sup>1/</sup>	MIL-STD-750		Symbol	<sup>2/</sup> Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Forward voltage	4011	$I_F = 200 \text{ mA dc}$	$V_F$		1.1	V dc
Reverse current	4016	DC method, $V_R =$ column 5 of table IV	$I_{R1}$		Column 6	$\mu\text{A dc}$
Regulator voltage (see 4.5.2)	4022	$I_Z =$ column 11 of table IV	$V_Z$	Column 1 $-V_Z \text{ tol}$	Column 1 $+V_Z \text{ tol}$	V dc
Regulation factor (see 4.5.9)		$I_Z =$ column 11, and $I_{ZL} =$ column 13 of table IV	$\Delta V_Z$		Column 12	V dc
Thermal impedance	3101	See 4.3.2	$Z_{\theta JX}$		35	$^{\circ}\text{C/W}$
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +150^{\circ}\text{C}$				
Reverse current	4016	DC method; $V_R =$ column 5 of table IV	$I_{R2}$		Column 2	$\mu\text{A dc}$
<u>Subgroup 4</u>						
Small-signal reverse breakdown impedance	4051	$I_Z =$ column 11 $I_{SIG} = 10 \text{ percent of } I_Z$	$Z_{ZT}$		Column 3	ohms
Noise density (see 4.5.7)		$I_Z = 250 \mu\text{A dc}$	$N_D$		Column 9	$\mu\text{V}/\sqrt{\text{Hz}}$
<u>Subgroup 5</u>						
Not applicable						
<u>Subgroup 6</u>						
Not applicable						
<u>Subgroup 8</u>						
Surge current	4066	See 4.5.1				
Electrical measurements		Table I, subgroup 2				

<sup>1/</sup> For sampling plan, see MIL-PRF-19500.

<sup>2/</sup> Column references are to table IV herein.

\* TABLE II. Group E inspection qualification and requalification (all product assurance levels).

Inspection <u>1/</u>	MIL-STD-750		Qualification conformance inspection (sampling plan)
	Method	Conditions	
<u>Subgroup 1</u> Temperature cycling Electrical measurements	1051	500 cycles.  See table III, steps 1, 3, 4 and 5.	22 devices, c = 0
<u>Subgroup 2</u> Steady-state dc intermittent life Electrical measurements	1037	6,000 cycles. $I_z$ = column 11 of table IV.  See table III, steps 2, 3, 4 and 5.	22 devices, c = 0
<u>Subgroup 4</u> Thermal impedance curves		Each supplier shall submit their qual-lot average and design thermal impedance curves to the qualifying activity. In addition, the optimal test conditions and $Z_{\theta JX}$ limit shall be provided to the qualifying activity in the qualification report.	
<u>Subgroups 5 and 6</u> Not applicable			
<u>Subgroup 7</u> Resistance to glass cracking	1057	Condition B. Cool down after solder immersion is permitted. Test until failure occurs on all devices or to a maximum of 25 cycles, whichever comes first.	n = 45

\* 1/ A separate sample may be pulled for each test.

TABLE III. Group A, B, and C electrical end-point measurements. 1/ 2/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Reverse current	4016	DC method; $V_R$ = column 5 of table IV	$I_{R1}$		Column 6 of table IV	$\mu\text{A dc}$
2.	Reverse current	4016	DC method, $V_R$ = column 5 of table IV	$I_{R3}$		Column 7 of table IV	$\mu\text{A dc}$
3.	Regulator voltage (see 4.5.2)	4022	$I_Z$ = column 11 of table IV	$V_Z$		Column 1 of table IV	V dc
4.	Small-signal breakdown impedance	4051	$I_Z$ = column 11 of table IV $I_{\text{sig}}$ = 10 percent of $I_Z$ (AC)	$Z_{ZT}$		Column 3 of table IV	ohms
5.	Thermal impedance	3101	See 4.3.2	$Z_{\theta JX}$		35	$^{\circ}\text{C/W}$

1/ The electrical measurements for appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500 are as follows:

- a. Subgroup 2, see table III herein, steps 1, 3, 4, and 5.
- b. Subgroup 3, see table III herein, steps 2, 3, and 4.
- c. Subgroup 6, see table III herein, steps 2, 3, and 4.

2/ The electrical measurements for appendix E, table VII of MIL-PRF-19500 are as follows:

- a. Subgroup 2 and 3, see table III herein, steps 1, 3, 4, and 5.
- b. Subgroup 6, see table III herein, steps 2, 3, and 4.

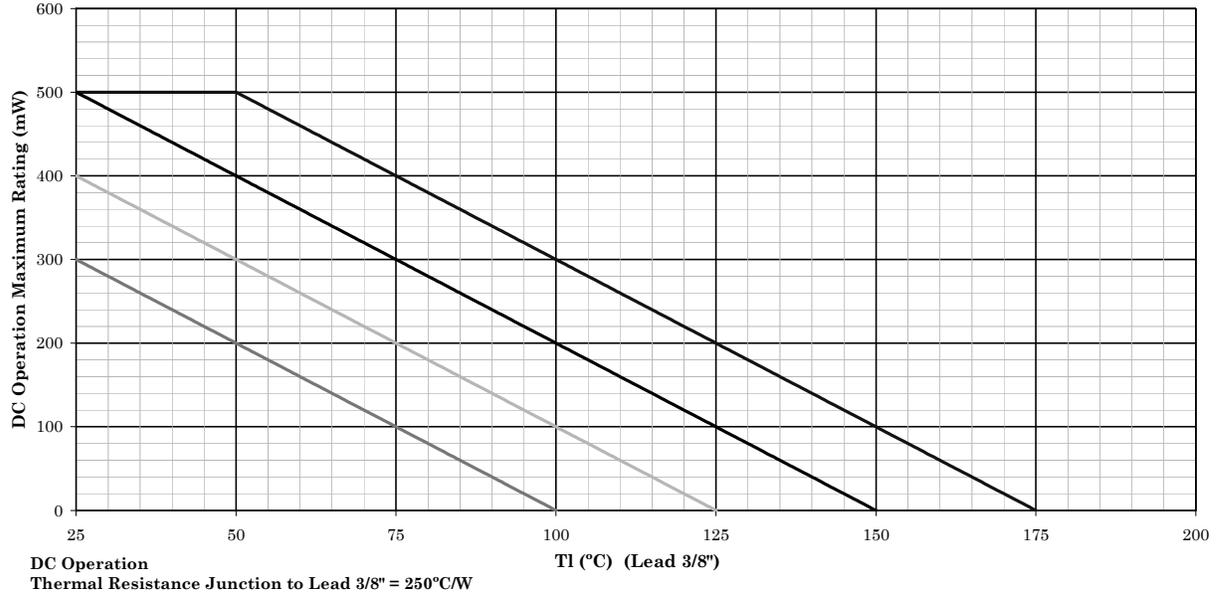
TABLE IV. Test ratings.

Type	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
	V <sub>Z</sub> Nom 1/ V dc	I <sub>R2</sub> T <sub>A</sub> = 150°C μA dc	Z <sub>ZT</sub> ohm	I <sub>ZSM</sub> mA	V <sub>R</sub> V dc	I <sub>R1</sub> μA dc	I <sub>R3</sub> (life test end points) μA dc	αV <sub>Z</sub> T <sub>1</sub> = +25°C T <sub>2</sub> = +125°C %/°C	N <sub>D</sub> μV/√Hz	I <sub>ZM</sub> mA	I <sub>Z</sub> test current mA	ΔV <sub>Z</sub> V dc	I <sub>ZL</sub> mA
1N5518B-1	3.3	10.0	26	1,600	1.0	5.0	10.0	-0.07	0.5	115	20	0.90	2.0
1N5519B-1	3.6	6.0	24	1,500	1.0	3.0	6.0	-0.065	0.5	105	20	0.90	2.0
1N5520B-1	3.9	4.0	22	1,250	1.0	1.0	2.0	-0.060	0.5	98	20	0.85	2.0
1N5521B-1	4.3	6.0	18	1,100	1.5	3.0	6.0	-0.055±.02	0.5	88	20	0.75	2.0
1N5522B-1	4.7	6.0	22	950	2.0	2.0	6.0	-0.043±.025	0.5	81	10	0.60	1.0
1N5523B-1	5.1	6.0	26	750	2.5	2.0	6.0	-.03±.03	0.5	75	5.0	0.65	0.25
1N5524B-1	5.6	4.0	30	700	3.5	2.0	4.0	-.03±.045	1.0	68	3.0	0.30	0.25
1N5525B-1	6.2	4.0	30	650	5.0	1.0	4.0	+.05	1.0	61	1.0	0.20	0.01
1N5526B-1	6.8	5.0	30	650	6.2	1.0	5.0	+.052	1.0	56	1.0	0.10	0.01
1N5527B-1	7.5	5.0	35	650	6.8	0.5	1.0	+.058	2.0	51	1.0	0.05	0.01
1N5528B-1	8.2	5.0	40	650	7.5	0.5	1.0	+.062	4.0	46	1.0	0.05	0.01
1N5529B-1	9.1	5.0	45	650	8.2	1.0	1.0	+.068	4.0	42	1.0	0.05	0.01
1N5530B-1	10.0	5.0	60	650	9.1	0.05	0.5	+.075	4.0	38	1.0	0.10	0.01
1N5531B-1	11.0	5.0	80	590	9.9	0.05	0.5	+.075	5.0	35	1.0	0.20	0.01
1N5532B-1	12.0	5.0	90	540	10.8	0.05	0.1	+.08	10	32	1.0	0.20	0.01
1N5533B-1	13.0	5.0	90	500	11.7	0.01	0.05	+.08	15	29	1.0	0.20	0.01
1N5534B-1	14.0	5.0	100	464	12.6	0.01	0.05	+.082	20	27	1.0	0.20	0.01
1N5535B-1	15.0	5.0	100	433	13.5	0.01	0.05	+.082	20	25	1.0	0.20	0.01
1N5536B-1	16.0	5.0	100	406	14.4	0.01	0.05	+.083	20	24	1.0	0.20	0.01
1N5537B-1	17.0	5.0	100	382	15.3	0.01	0.05	+.085	20	22	1.0	0.20	0.01
1N5538B-1	18.0	5.0	100	361	16.2	0.01	0.05	+.085	20	21	1.0	0.20	0.01
1N5539B-1	19.0	5.0	100	342	17.1	0.01	0.05	+.086	20	20	1.0	0.20	0.01
1N5540B-1	20.0	5.0	100	325	18.0	0.01	0.05	+.086	20	19	1.0	0.20	0.01
1N5541B-1	22.0	5.0	100	295	19.8	0.01	0.05	+.087	25	17	1.0	0.25	0.01
1N5542B-1	24.0	5.0	100	271	21.6	0.01	0.05	+.088	30	16	1.0	0.30	0.01
1N5543B-1	25.0	5.0	100	260	22.4	0.01	0.05	+.09	35	15	1.0	0.35	0.01
1N5544B-1	28.0	5.0	100	240	25.2	0.01	0.05	+.091	40	14	1.0	0.40	0.01
1N5545B-1	30.0	5.0	100	216	27.0	0.01	0.05	+.091	45	13	1.0	0.45	0.01
1N5546B-1	33.0	5.0	100	197	29.7	0.01	0.05	+.092	50	12	1.0	0.50	0.01

1/ Voltage tolerance devices (examples: 1N5518B-1 are ±5 percent, 1N5518C-1 are ±2 percent, and 1N5518D-1 are ±1 percent tolerance).

### Temperature-Power Derating Curve

D0-7, D0-35



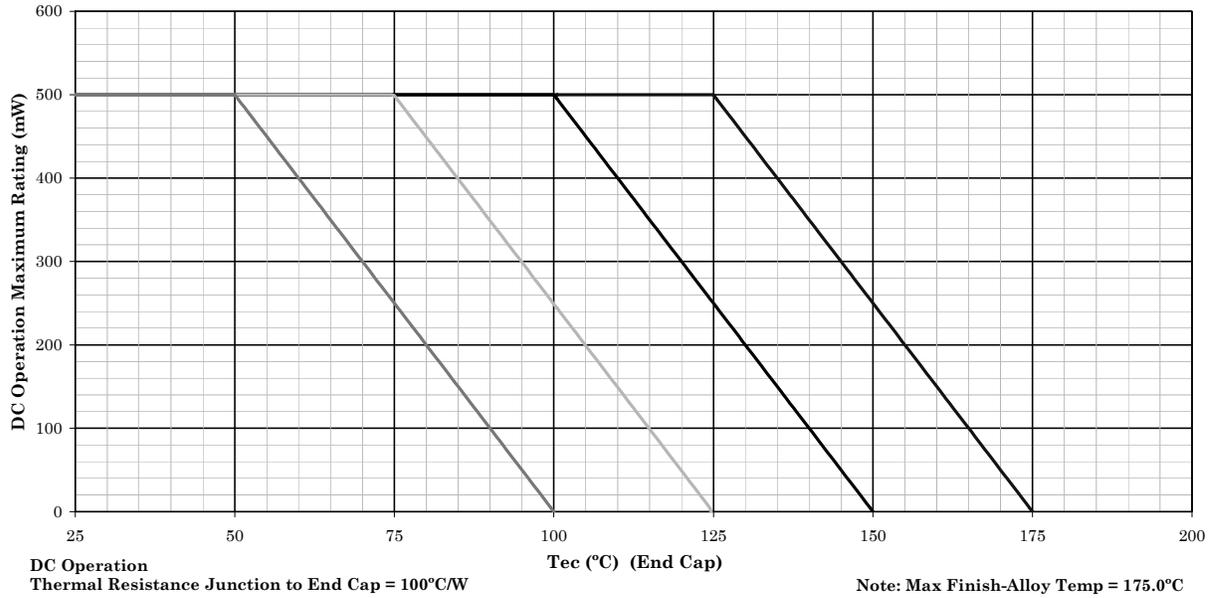
NOTES:

1. Derate design curve constrained by the maximum junction temperature ( $T_J \leq 175^\circ\text{C}$ ) and power rating specified. (See paragraph 1.3 herein)
2. Derate design curve chosen at  $T_J \leq 150^\circ\text{C}$ , where the maximum temperature of electrical test is performed.
3. Derate design curve chosen at  $T_J \leq 125^\circ\text{C}$ , and  $110^\circ\text{C}$  to show power rating where most users want to limit  $T_J$  in their application.

\* FIGURE 4. Temperature-power derating curve (DO-35, DO-7).

### Temperature-Power Derating Curve

DO-213AA



**NOTES:**

1. Derate design curve constrained by the maximum junction temperature ( $T_J \leq 175^\circ\text{C}$ ) and power rating specified. (See paragraph 1.3 herein)
2. Derate design curve chosen at  $T_J \leq 150^\circ\text{C}$ , where the maximum temperature of electrical test is performed.
3. Derate design curve chosen at  $T_J \leq 125^\circ\text{C}$ , and  $110^\circ\text{C}$  to show power rating where most users want to limit  $T_J$  in their application.

\* FIGURE 5. Temperature-power derating curve (DO-213AA).

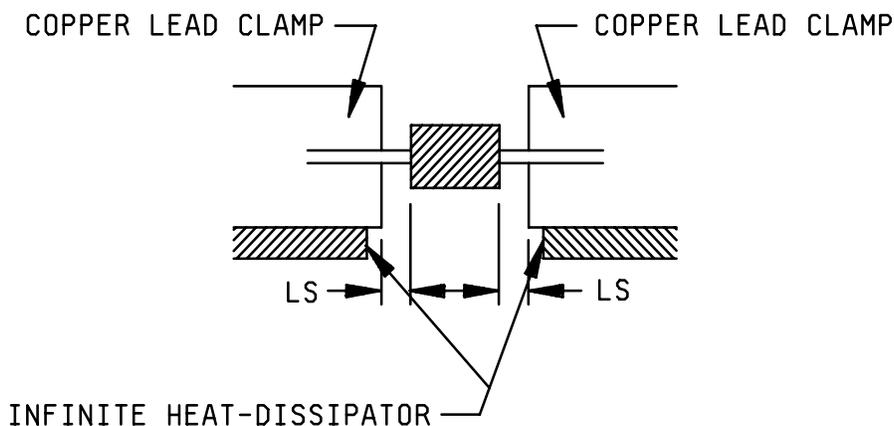
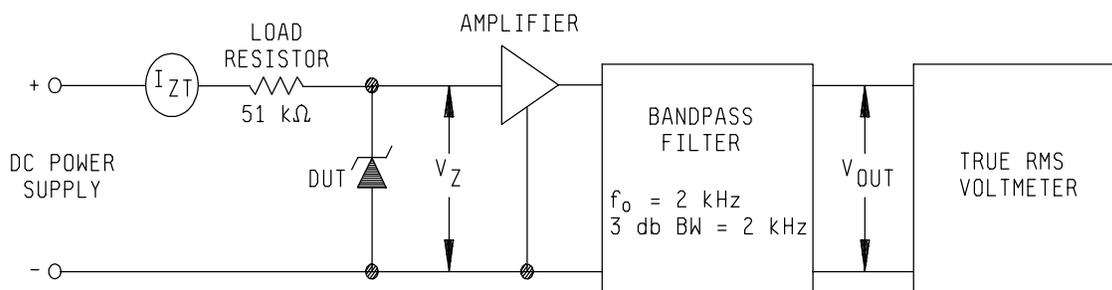


FIGURE 6. Mounting conditions.



NOTES:

1. Input voltage and lead resistance should be high so that zener can be driven from a constant current source.
2. Input impedance of band pass filter should be high compared with the dynamic impedance of the diode under test.
3. Filter bandwidth characteristics shall be as follows:
  - a.  $f_0 = 2,000 \text{ Hz}$
  - b. Shape factor, -40 db to -3 db, approximately 2.
  - c. Passband at the -3 db is 1,000 Hz  $\pm$ 50 Hz to 3,000 Hz  $\pm$ 150 Hz.
  - d. Passband at the -40 db is 500 Hz  $\pm$ 50 Hz to 6,000 Hz  $\pm$ 600 Hz.

FIGURE 7. Circuit for determination of noise density.

## 5. PACKAGING

\* 5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

\* 6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. Product assurance level and type designator.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43216-5000 or e-mail vqe.chief@dla.mil.

6.4 Substitution information.

6.4.1 Substitutability of 2 percent and 1 percent tolerance devices. Devices of tighter tolerance are a direct one way substitute for the looser tolerance devices (example: JANTX1N5518D-1 substitutes for JANTX1N5518B-1).

\* 6.5 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example: JANHCA5518B) will be identified on the QPL.

(1) JANHC and JANKC ordering information					
PIN	Manufacturer CAGE		PIN	Manufacturer CAGE	
	43611	12954		43611	12954
1N5518B	A1N5518B	B1N5518B	1N5533B-1	A1N5533B	B1N5533B
1N5519B	A1N5519B	B1N5519B	1N5534B-1	A1N5534B	B1N5534B
1N5520B	A1N5520B	B1N5520B	1N5535B-1	A1N5535B	B1N5535B
1N5521B	A1N5521B	B1N5521B	1N5536B-1	A1N5536B	B1N5536B
1N5522B	A1N5522B	B1N5522B	1N5537B-1	A1N5537B	B1N5537B
1N5523B	A1N5523B	B1N5523B	1N5538B-1	A1N5538B	B1N5538B
1N5524B	A1N5524B	B1N5524B	1N5539B-1	A1N5539B	B1N5539B
1N5525B	A1N5525B	B1N5525B	1N5540B-1	A1N5540B	B1N5540B
1N5526B	A1N5526B	B1N5526B	1N5541B-1	A1N5541B	B1N5541B
1N5527B	A1N5527B	B1N5527B	1N5542B-1	A1N5542B	B1N5542B
1N5528B	A1N5528B	B1N5528B	1N5543B-1	A1N5543B	B1N5543B
1N5529B	A1N5529B	B1N5529B	1N5544B-1	A1N5544B	B1N5544B
1N5530B	A1N5530B	B1N5530B	1N5545B-1	A1N5545B	B1N5545B
1N5531B	A1N5531B	B1N5531B	1N5546B-1	A1N5546B	B1N5546B
1N5532B	A1N5532B	B1N5532B			

(1) C and D tolerance suffix are also applicable to JANHC and JANKC chips.

6.6 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Army - CR  
Navy - EC  
Air Force - 11  
NASA - NA  
DLA - CC

Preparing activity:  
DLA - CC  
(Project 5961-2732)

Review activities:  
Air Force - 19, 99

\* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://www.dodssp.daps.mil>.