

The documentation and process conversion measures necessary to comply with this document shall be completed by 5 May 2014.

INCH-POUND

MIL-PRF-19500/337L  
 AMENDMENT 1  
 5 February 2014  
 SUPERSEDING  
 MIL-PRF-19500/337L  
 15 March 2013

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, SWITCHING, TYPES 1N4153-1, 1N4153UR-1, 1N4153UB, 1N4153UBCA, 1N4153UBCC, 1N4153UBD, 1N4153UBN, 1N4153UBND, 1N4534, AND 1N4534UB, 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 controlled forward voltage switching diodes. Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See [figure 1](#) (axial leads), [figure 2](#) (DO-213AA), [figure 3](#) (UB and UBN), [figure 4](#) (die).

1.3 Maximum ratings. Unless otherwise specified  $T_A = +25^\circ\text{C}$ .

Type	V <sub>BR</sub>	V <sub>RWM</sub>	I <sub>O</sub> (PCB) T <sub>A</sub> = 75°C (1) (2)	I <sub>FSM</sub> t <sub>p</sub> = 8.3ms	T <sub>STG</sub> & T <sub>J</sub>	R <sub>θJL</sub> L = .375 inch (9.53 mm) (3)	R <sub>θJEC</sub> (UR) (2)	R <sub>θJA</sub> (PCB) (2) (3) (4)	R <sub>θJSP</sub> (UB) (3) (4)
	V dc	V (pk)	mA	A (pk)	°C	°C/W	°C/W	°C/W	°C/W
1N4153-1 1N4153UR-1	100	75	200	2	-65 to +175	250	100	325	
1N4153UB, UBN, UBCA, UBCC, UBD, UBND					-55 to +200				
1N4534 1N4534UR					-55 to +175	250	100	325	
1N4534UB, 1N4534UBN					-55 to +200				

- (1) For temperature-current derating curves, see [figures 5](#) and [6](#).
- (2)  $T_A = +75^\circ\text{C}$  for both axial and metal electrode leadless face diodes (MELF) (UR) on printed circuit board (PCB), PCB = FR4 - .0625 inch (1.59 mm) 1-layer 1-Oz Cu, horizontal, in still air; pads for (UR) = .061 inch (1.55 mm) x .105 inch (2.67 mm); pads for axial = .092 inch (2.34 mm) diameter, strip = .030 inch (0.76 mm) x 1 inch (25.4 mm) long, lead length  $L \leq .187$  inch ( $\leq 4.75$  mm);  $R_{\theta JA}$  with a defined PCB thermal resistance condition included, is measured at  $I_O = 200$  mA dc.
- (3) See [figures 7](#), [8](#), and [9](#) for thermal impedance curves.
- (4)  $R_{\theta JSP}$  refers to thermal resistance from junction to the solder pads of the UB and UBN package.

Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to [Semiconductor@dla.mil](mailto:Semiconductor@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

MIL-PRF-19500/337L  
w/AMENDMENT 1

1.4 Primary electrical characteristics at  $T_A = +25^\circ\text{C}$ , unless otherwise specified.

Limits	V <sub>F1</sub> I <sub>F</sub> = 100 $\mu\text{A}$ dc	V <sub>F2</sub> I <sub>F</sub> = 250 $\mu\text{A}$ dc	V <sub>F3</sub> I <sub>F</sub> = 1 mA dc	V <sub>F4</sub> I <sub>F</sub> = 2 mA dc	V <sub>F5</sub> I <sub>F</sub> = 10 mA dc	V <sub>F6</sub> I <sub>F</sub> = 20 mA dc
Min	0.490 V dc	0.530 V dc	0.590 V dc	0.620 V dc	0.700 V dc	0.740 V dc
Max	0.550 V dc	0.590 V dc	0.670 V dc	0.700 V dc	0.810 V dc	0.880 V dc

Limit	I <sub>R1</sub> V <sub>R</sub> = 50 V dc	I <sub>R2</sub> V <sub>R</sub> = 50 V dc T <sub>A</sub> = 150°C	C V <sub>R</sub> = 0 V dc f = 1 MHz	t <sub>rr</sub> I <sub>F</sub> = I <sub>R</sub> = 10 mA dc R <sub>L</sub> = 100 ohms, I <sub>RR</sub> = 1.0 mA dc
Max	50 nA dc	50 $\mu\text{A}$ dc	2.0 pF	4 ns

(1) Primary electrical characteristics for surface mount devices are equivalent to the corresponding non-surface mount devices unless otherwise specified.

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.

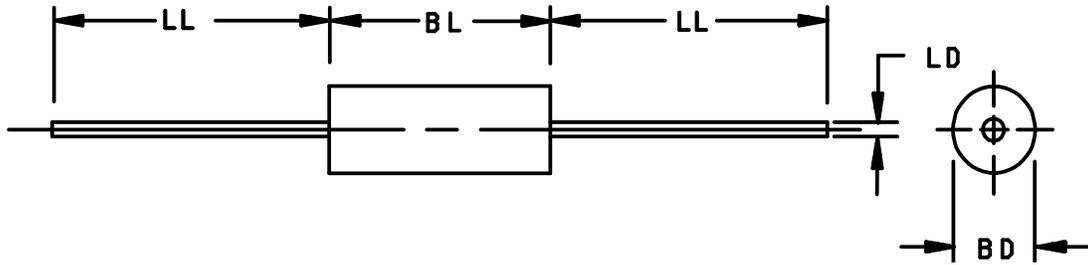
DEPARTMENT OF DEFENSE STANDARDS

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

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

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

MIL-PRF-19500/337L  
w/AMENDMENT 1



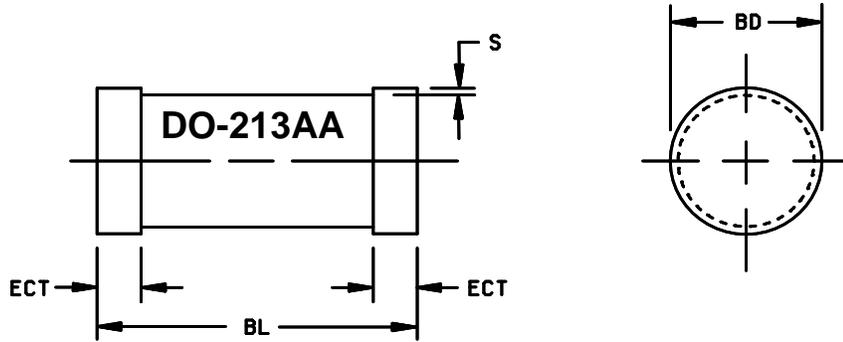
Types	Dimensions				
	Ltr	Inches		Millimeters	
		Min	Max	Min	Max
1N4153-1 (DO-35)	BD	.056	.075	1.42	1.91
	BL	.140	.180	3.56	4.57
	LD	.018	.022	0.46	0.56
	LL	1.000	1.500	25.40	38.10
1N4534 (DO-34)	BD	.050	.075	1.27	1.91
	BL	.080	.120	2.03	3.05
	LD	.018	.022	0.46	0.56
	LL	1.000	1.500	25.40	38.10

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

FIGURE 1. Physical dimensions.

MIL-PRF-19500/337L  
w/AMENDMENT 1



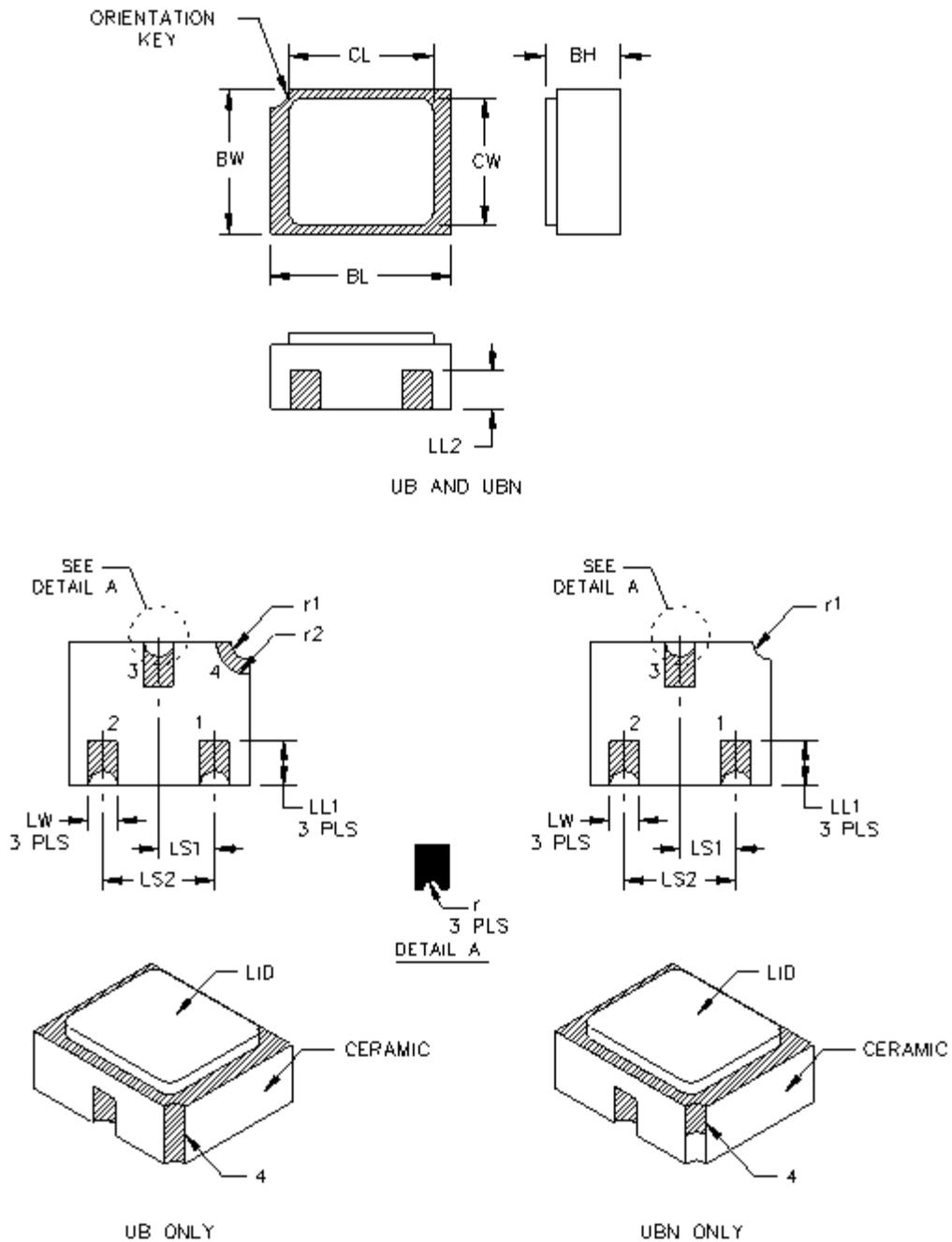
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.063	.067	1.60	1.70
BL	.130	.146	3.30	3.70
ECT	.016	.022	0.41	0.55
S	.001 min		0.03 min	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Dimensions are pre-solder dip.
4. Referencing to dimension S, minimum clearance of glass body to mounting surface on all orientations.
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

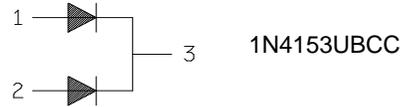
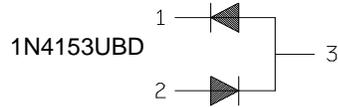
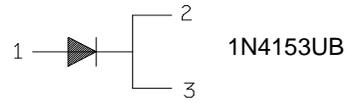
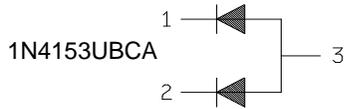
FIGURE 2. Physical dimensions, 1N4153UR-1 (DO-213AA).

MIL-PRF-19500/337L  
w/AMENDMENT 1



\* FIGURE 3. Physical dimensions, surface mount (UB and UBN version).

MIL-PRF-19500/337L  
w/AMENDMENT 1

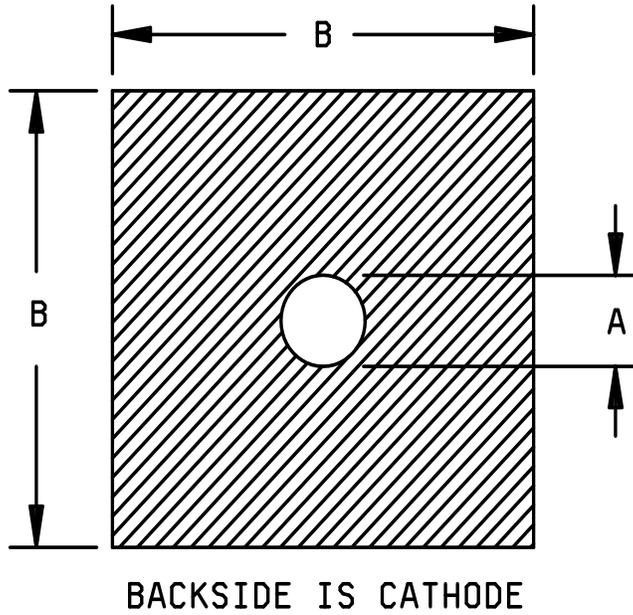


Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
BL	.115	.128	2.92	3.25	
BW	.095	.108	2.41	2.74	
BH	.046	.056	1.17	1.42	UB and UBN only
CL		.128		3.25	
CW		.108		2.74	
LL1	.022	.038	0.56	0.97	3 places
LL2	.014		0.356		3 places
LS <sub>1</sub>	.035	.039	0.89	0.99	
LS <sub>2</sub>	.071	.079	1.80	2.01	
LW	.016	.024	0.41	0.61	
r1		.012		0.30	4
r2		.022		0.56	UB only, 4

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
- \* 4. For design reference only.
- \* 5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

\* FIGURE 3. Physical dimensions, surface mount (UB and UBN version).



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.0059	.0061	.150	.155
B	.0130	.0170	.330	.432

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Element evaluation accomplished utilizing TO-5 package.
4. The physical characteristics of the die are:

Metallization:

Top (anode): Al.

Back (cathode): Au.

Al thickness: 25,000 Å minimum.

Gold thickness: 4,000 Å minimum.

Chip thickness: .010 inches (0.25 mm) ±.002 inches (0.05 mm).

FIGURE 4. Physical dimensions, JANHCA and JANKCA die.

### 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 manufacturers list (QML) before contract award (see 4.2 and 6.3).

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

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on [figures 1](#) (axial leads), [figure 2](#) (DO-213AA), [figure 3](#) (UB and UBN), [figure 4](#) (die).

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 (except UB version) shall be metallurgically bonded, double plug construction in accordance with the requirements of MIL-PRF-19500. All glass diodes shall be designed with sufficient thermal compensation in the axial direction to optimize tensile and compressive stresses. Dimensional analysis is required of all materials used to achieve axial thermal compensation. Dimensional tolerances and corresponding coefficient of thermal expansion (CTE) shall be documented on the DSCC Design and Construction Form 36D and shall be approved by the qualifying activity to maintain qualification. Dimensional tolerances shall be sufficiently tight enough to prevent excessive stresses due to the inherent CTE mismatch. The UB devices shall be eutectically mounted and wire bonded in a ceramic package. The 'UR' version shall be structurally identical to the axial leaded versions except for end-cap lead attachment.

\* 3.4.3 UB dual devices. Package styles UB and UBN use designators CA, D, and CC to designate dual configurations.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500. Manufacturer's identification and date code shall be marked on the devices. Initial container package marking shall be in accordance with MIL-PRF-19500. The polarity shall be indicated with a contrasting color band to denote the cathode end. The prefixes JAN, JANTX, and JANTXV may be abbreviated as J, JX, and JV, respectively. The part number may be reduced to J4153, JX4153, or JV4153. No color coding shall be permitted for part numbering.

3.5.1 UR devices. For 'UR' version devices only, all marking, except polarity, may be omitted from the body, but shall be retained on the initial container. Polarity marking of 'UR' devices shall consist as a minimum, a band or three contrasting dots around the periphery of the cathode. At the option of the manufacturer, UR surface mount devices may include laser marking on an end-cap, to include part number and lot date code for all levels. The prefixes JAN, JANTX, or JANTXV may be abbreviated as J, JX, or JV, respectively. (Example: The part number may be reduced to JV4153).

3.5.2 UB devices. 'UB' devices do not require polarity marking.

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

3.7 Electrical test requirements. The electrical test requirements shall be as specified in [table I](#) herein.

3.8 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.

MIL-PRF-19500/337L  
w/AMENDMENT 1

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 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not require the performance of [table II](#) tests, the tests specified in [table II](#) herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

4.3 Screening (JANTX and JANTXV levels). Screening shall be in accordance with table E-IV of MIL-PRF-19500 and as specified herein. Specified electrical measurements shall be made in accordance with [table I](#) herein. Devices that exceed the limits of [table I](#) herein shall not be acceptable.

Screening (see table E-IV of MIL-PRF-19500)	JANTXV and JANTX level
(1) 3c	Thermal impedance (see 4.3.2)
9	Not required
10	Method 1038 of MIL-STD-750, condition A
(2) 11	$I_{R1}$ and $V_{F1}$
12	See 4.3.1
(3) (4) 13	Subgroup 2 of <a href="#">table I</a> herein; $\Delta I_{R1} = 100$ percent of initial value or 15 nA dc, whichever is greater; $\Delta V_{F1} = 25$ mV dc.

- (1) Thermal impedance shall 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) Test within 24 hours after removal from test.
- (3) When thermal impedance is performed prior to screen 13, it is not required to be repeated in screen 13.
- (4)  $PDA \leq 5$  percent.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows (see 4.5.2): Method 1038 of MIL-STD-750, condition B.  $V_R =$  rated  $V_{RWM}$ ;  $f = 50 - 60$  Hz;  $I_{O(min)} = 200$  mA dc or  $I_F = 200$  mA dc minimum =  $I_{O(PCB)}$ .  $T_A = +75^\circ\text{C}$  maximum. The maximum current density of small die shall be submitted to the qualifying activity for approval. Alternate mounting conditions shall be submitted to the qualifying activity for approval. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, and mounting conditions) may be used for JANTX and JANTXV quality levels. A justification demonstrating equivalence is required. In addition, the manufacturing site's burn-in data and performance history will be essential criteria for burn-in modification approval.

MIL-PRF-19500/337L  
w/AMENDMENT 1

4.3.2 Thermal impedance measurements. The thermal impedance measurements shall be performed in accordance with method 3101 or 4081 of MIL-STD-750, as applicable, using the guidelines in that method for determining  $I_H$  and  $I_M$ .  $t_{MD}$  shall be 70  $\mu$ s maximum,  $t_H$  shall be 10 ms maximum. The thermal impedance limit shall comply with the thermal impedance graphs on figures 7, 8, and 9 (less than or equal to the curve value at the same  $t_H$  time) and shall be less than the process determined statistical maximum limit as outlined in method 3101 or 4081 of MIL-STD-750, as applicable. See group E, subgroup 4 of table II herein.

4.3.3 Screening (JANHC and JANKC). Screening of JANHC and JANKC die shall be in accordance with appendix G of MIL-PRF-19500. Burn-in duration for the JANKC level follows JANS requirements; the JANHC follows JANTX requirements.

4.3.4 JAN testing. JAN level product shall have temperature cycling and thermal impedance testing performed in accordance with MIL-PRF-19500, JANTX level screening level requirements. Electrical testing shall be in accordance with table I, subgroup 2 herein.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with table E-V of MIL-PRF-19500, table I herein, and as specified herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and 4.4.2.1 herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2.

\* 4.4.2.1 Group B inspection, table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Leaded samples from the same lot may be used in lieu of 'UR' suffix sample for life test.

<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, 45 cycles, including screening.
B2	2005	$I_F = 100$ mA, axial tensile stress = 8 lbs, $T_A = +150^\circ\text{C}$ ; (not applicable to UR, UB, and UBN package).
B3	1027	$V(p_k) = \text{rated } V_{RWM}$ ; $f = 50 - 60$ Hz; $I_O = 200$ mA dc minimum; adjust $T_A$ or $I_O$ to obtain a minimum $T_J$ of +150°C. (See 4.5.2.)
B4	2101	Decap analysis; scribe and break (not applicable for UB and UBN).
B6	1032	$T_A = +175^\circ\text{C}$ for non UB style packages and $T_A = +200^\circ\text{C}$ for UB style packages.

MIL-PRF-19500/337L  
w/AMENDMENT 1

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VII of MIL-PRF-19500, and as follows. Electrical measurements (end-points) shall be in accordance with [table I](#), subgroup 2 herein.

\* 4.4.3.1 Group C inspection, table E-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, 45 cycles including screening.
C2	2036	Tension - test condition A; weight = 10 pounds, t = 15 s; lead fatigue = condition E (not applicable to UR, UB, and UBN suffix types).
C5	4081	L = .375 inch (9.53 mm), $R_{\theta JL} = 250^{\circ}\text{C/W}$ maximum; $R_{\theta JEC} = 100^{\circ}\text{C/W}$ ; (see 4.3.2), 22 devices, c = 0.
C6	1026	1,000 hours minimum, $V(pk) = \text{rated } V_{RWM}$ ; f = 50 - 60 Hz; $I_O = 200 \text{ mA}$ dc minimum; adjust $T_A$ or $I_O$ to obtain a minimum $T_J$ of +150°C. (See 4.5.2.)

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E-IX of MIL-PRF-19500, and [table II](#) herein. Electrical measurements (end-points) shall be in accordance with [table I](#), subgroup 2 herein.

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

4.5.1 Pulse measurements. Conditions for pulse measurements shall be as specified in section 4 of MIL-STD-750.

4.5.2 Free air power burn-in and life tests. The use of a current limiting or ballast resistor is permitted provided that each device under test still sees the full  $I_O$  (minimum) and that the minimum applied voltage, where applicable, is maintained throughout the burn-in period. Method 3100 of MIL-STD-750 shall be used to measure  $T_J$ .

MIL-PRF-19500/337L  
w/AMENDMENT 1

TABLE I. Group A inspection.

Inspection <u>1/ 2/ 3/</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Thermal impedance	3101	See 4.3.2	Z <sub>θJX</sub>			°C/W
Forward voltage	4011	I <sub>F</sub> = 100 μA dc (pulsed, see 4.5.1)	V <sub>F1</sub>	0.49	0.55	V dc
Forward voltage	4011	I <sub>F</sub> = 250 μA dc (pulsed, see 4.5.1)	V <sub>F2</sub>	0.53	0.59	V dc
Forward voltage	4011	I <sub>F</sub> = 1 mA dc (pulsed, see 4.5.1)	V <sub>F3</sub>	0.59	0.67	V dc
Forward voltage	4011	I <sub>F</sub> = 2 mA dc (pulsed, see 4.5.1)	V <sub>F4</sub>	0.62	0.70	V dc
Forward voltage	4011	I <sub>F</sub> = 10 mA dc (pulsed, see 4.5.1)	V <sub>F5</sub>	0.70	0.81	V dc
Reverse current	4016	DC method; V <sub>R</sub> = 50 V dc	I <sub>R1</sub>		50	nA dc
Breakdown voltage	4021	I <sub>R</sub> = 5 μA dc	V <sub>BR1</sub>	100		V dc
<u>Subgroup 3</u>						
High temperature operation:		T <sub>A</sub> = +150°C				
Reverse current	4016	DC method, V <sub>R</sub> = 50 V dc	I <sub>R2</sub>		50	μA dc
Low temperature operation:		T <sub>A</sub> = -55°C				
Breakdown voltage	4021	I <sub>R</sub> = 5 μA dc	V <sub>(BR)2</sub>	75		V dc
<u>Subgroup 4</u>						
Junction capacitance	4001	V <sub>R</sub> = 0 V dc, f = 1 MHz, V <sub>sig</sub> = 50 mV (pk to pk), max	C		2.0	pF
Reverse recovery time	4031	Condition A, I <sub>F</sub> = I <sub>RM</sub> = 10 mA dc	t <sub>rr</sub>		4	ns
Scope display evaluation	4023	See method 4023 of MIL-STD-750, figures 4023-3, 4023-7,4023 -9, 4023-10 only				
<u>Subgroup 5</u>						
Not applicable						

See footnotes at end of table.

MIL-PRF-19500/337L  
w/AMENDMENT 1

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u> <u>2/</u> <u>3/</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 6</u>	4066	Condition A (sine wave) $i_f(\text{surge}) = 2 \text{ A(pk)}$ , $I_O = 0$ , $V_{RM} = 0$ , 10 surges, 8.3 ms width each, one surge per minute, $T_A = +25^\circ\text{C}$				
Surge current		or Condition B (square wave) $I_F(\text{surge}) = 4 \text{ A (pk)}$ 10 surges, $1 \mu\text{s}$ width each, duty factor = 0.0055 percent, $T_A = +25^\circ\text{C}$				
Electrical measurements		See <a href="#">table I</a> , subgroup 2.				
<u>Subgroup 7</u>						
Not applicable						

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

2/ UBCA, UBCC, UBD, and UBND devices are to have each diode tested individually.

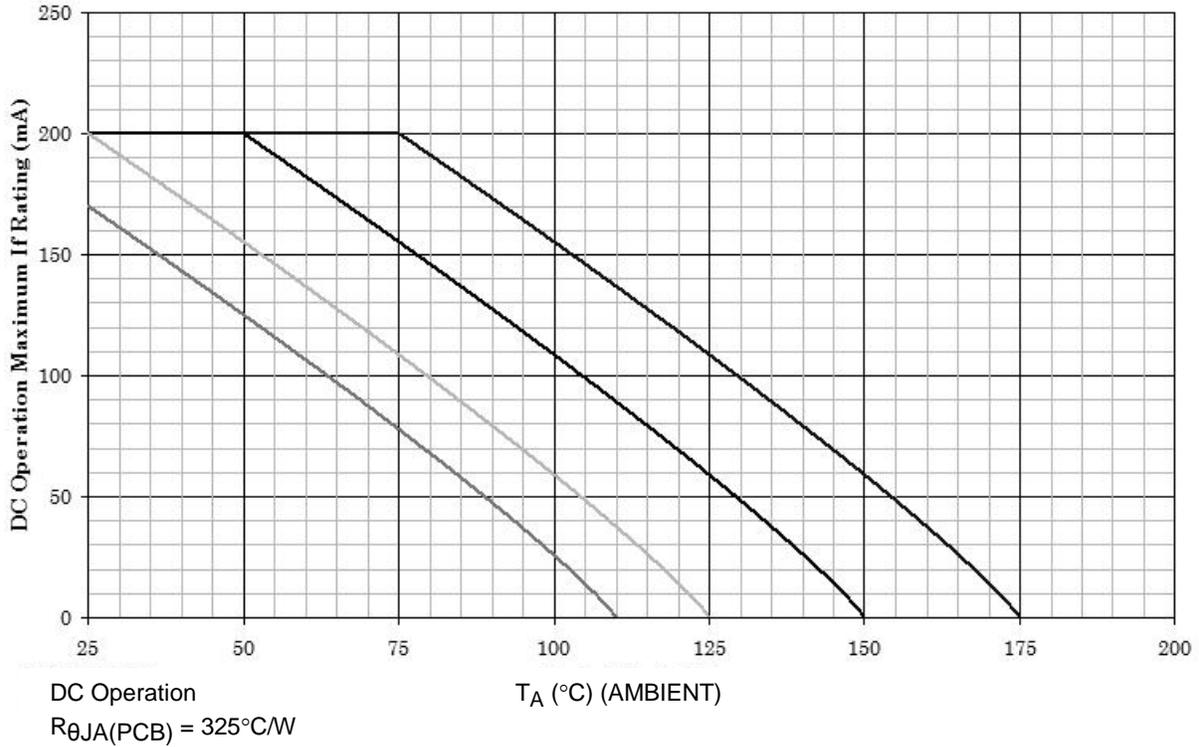
3/ Electrical characteristics for all surface mount versions are identical to the corresponding axial leaded versions unless otherwise specified.

MIL-PRF-19500/337L  
w/AMENDMENT 1

\* TABLE II. Group E inspection (all quality levels) for qualification or re-qualification only.

Inspection	MIL-STD-750		Sample plan
	Method	Conditions	
<u>Subgroup 1</u>			45 devices c = 0
Thermal shock (glass strain)	1056	100 cycles 0°C to +100°C	
Temperature cycling	1051	500 cycles, -65°C to +175°C	
Hermetic seal	1071	Gross leak only. Fine and gross leak required for UB and UBN	
Electrical measurements		See <a href="#">table I</a> , subgroup 2.	
<u>Subgroup 2</u>			45 devices c = 0
Intermittent operating life	1037	10,000 cycles; $I_f = 300$ mA dc, $T_{on} = T_{off} = 1$ minute	
Electrical measurements		See <a href="#">table I</a> , subgroup 2.	
<u>Subgroup 4</u>			15 devices c = 0
Thermal resistance	4081	$R_{\theta JS P}$ can be calculated but shall be measured once in the same package with a similar die size to confirm calculations (may apply to multiple specification sheets)	
Thermal impedance curves		See MIL-PRF-19500, table E-IX, group E, subgroup 4	Sample size N/A
<u>Subgroup 5</u>			
Not applicable			
<u>Subgroup 8</u>			45 devices
Resistance to glass cracking	1057	Test condition B. Test until failure occurs or to a maximum of 25 cycles, whichever comes first	
<u>Subgroup 9</u>			22 devices c = 0
Monitored mission temperature cycling	1055	Not required for UB, and UBN suffix devices	
Electrical measurements		See <a href="#">table I</a> , subgroup 2	

### Temperature-Current Derating Curve 1N4153-1, 1N4153UR-1, 1N4534

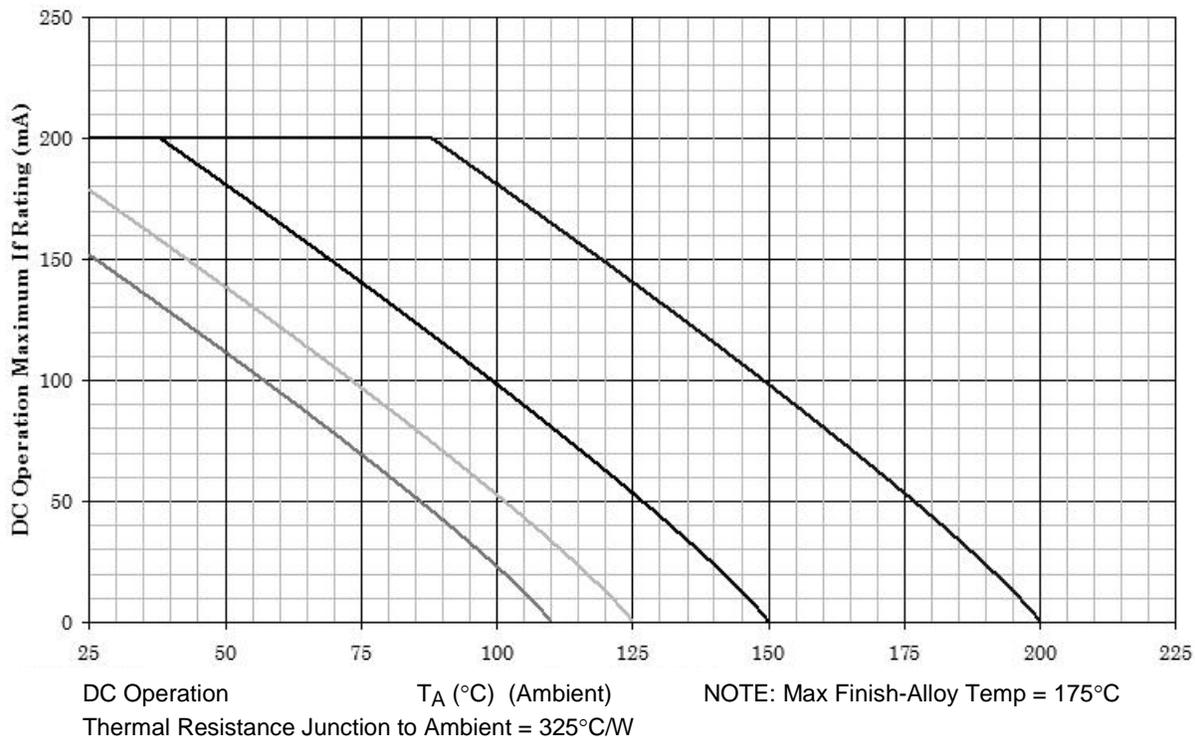


**NOTES:**

1. All devices are capable of operating at  $\leq T_J$  specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum  $T_J$  allowed.
2. Derate design curve constrained by the maximum junction temperature ( $T_J \leq 175^{\circ}\text{C}$ ) and current rating specified. (See 1.3.)
3. Derate design curve chosen at  $T_J \leq 150^{\circ}\text{C}$ , where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at  $T_J \leq 125^{\circ}\text{C}$ , and  $110^{\circ}\text{C}$  to show current rating where most users want to limit  $T_J$  in their application.

FIGURE 5. Temperature-current derating graph (all devices).

### Temperature-Current Derating Curve 1N4153UB, 1N4534UB versions

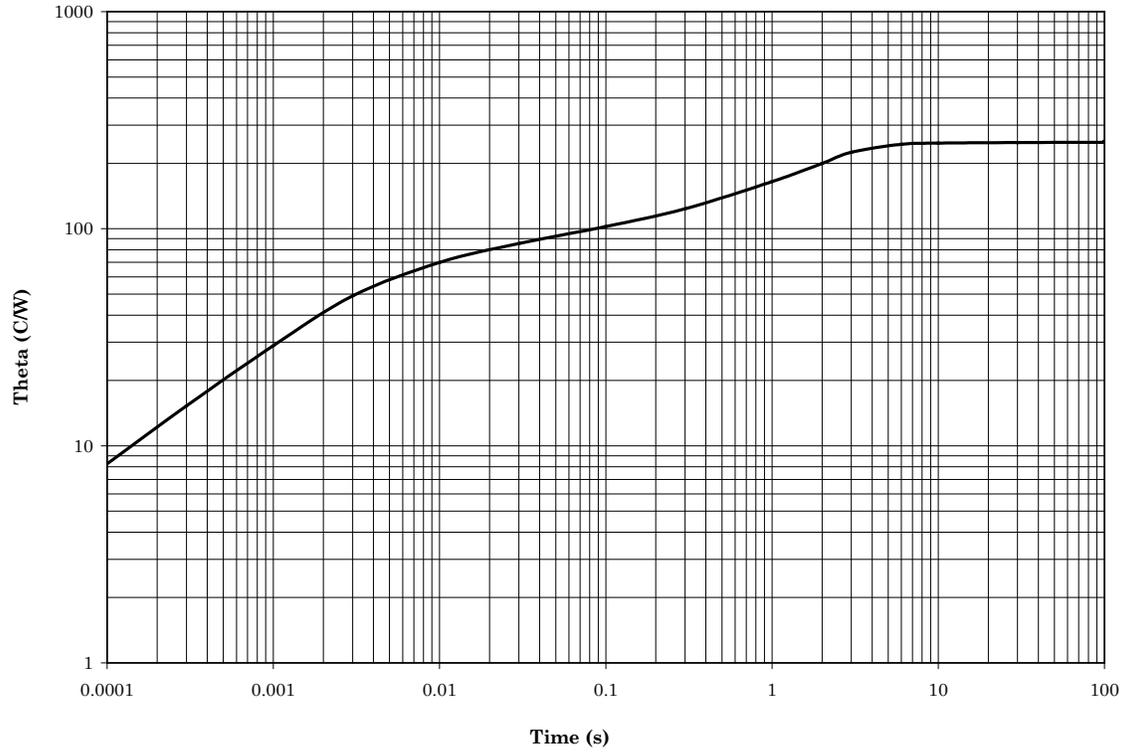


NOTES:

1. All devices are capable of operating at  $\leq T_J$  specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum  $T_J$  allowed.
2. Derate design curve constrained by the maximum junction temperature ( $T_J \leq 175^\circ\text{C}$ ) and current rating specified. (See 1.3.)
3. Derate design curve chosen at  $T_J \leq 150^\circ\text{C}$ , where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at  $T_J \leq 125^\circ\text{C}$ , and  $110^\circ\text{C}$  to show current rating where most users want to limit  $T_J$  in their application.

FIGURE 6. Temperature-current derating graph (UB versions).

**1N4153-1, 1N4534 DO-35, DO-34 Axial  $T_L = 25^\circ\text{C}$   
Maximum Thermal Impedance Plots**

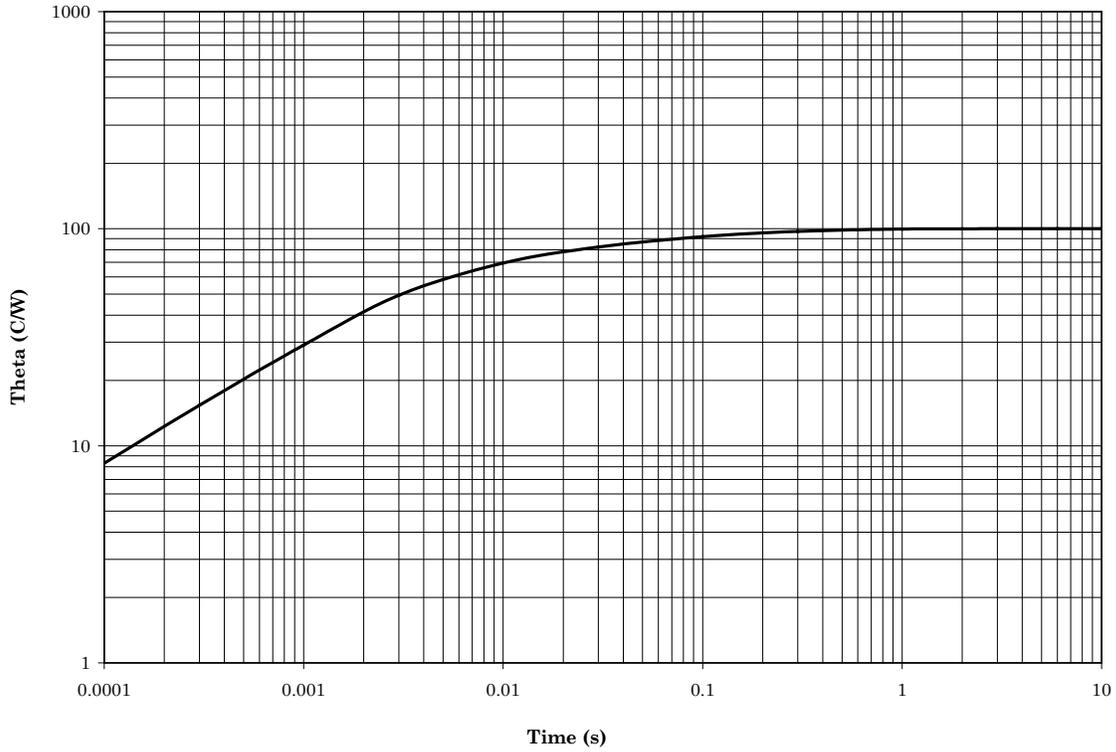


$$R_{\theta JL} = 250^\circ\text{C/W}$$

NOTE:  $Z_{\theta JX} = 70^\circ\text{C/W}$  maximum at  $t_H = 10\text{ms}$ .

FIGURE 7. Thermal impedance (axial leads).

**1N4153UR-1 DO-213AA TEC = 25°C  
Maximum Thermal Impedance Plots**

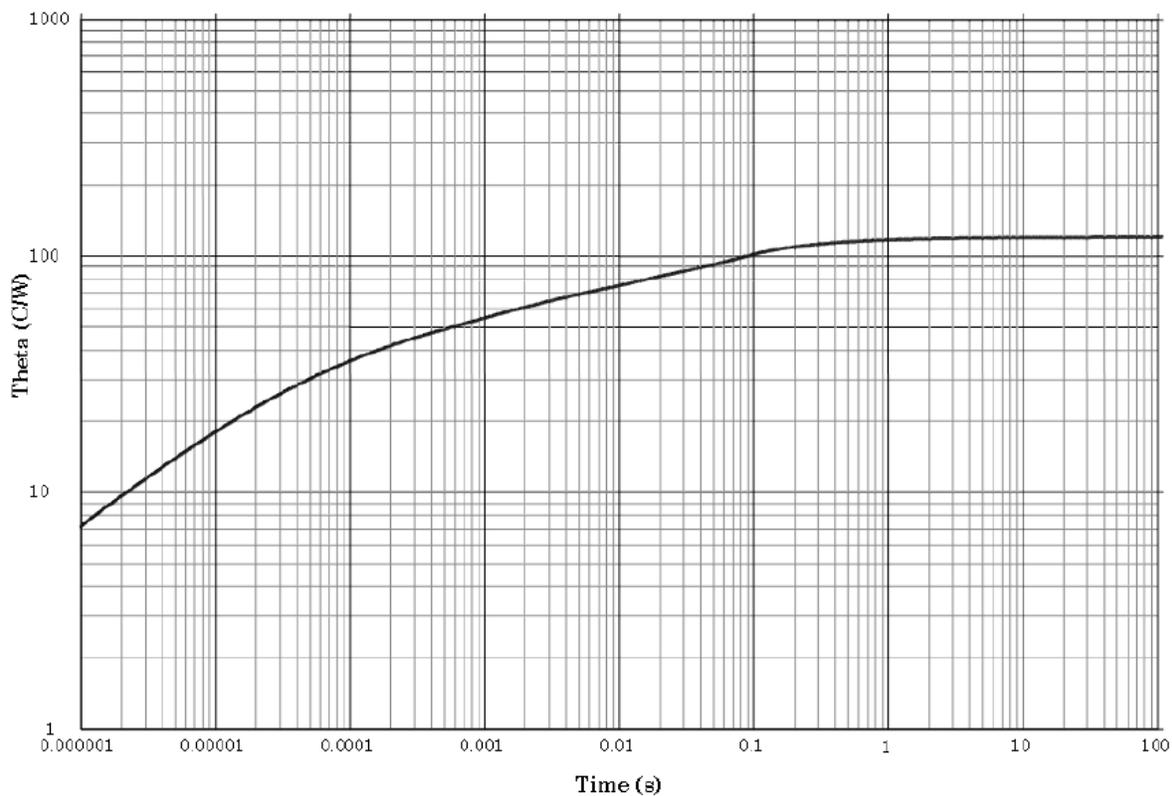


$R_{\theta JEC} = 100^{\circ}\text{C/W}$

NOTE:  $Z_{\theta JX} = 70^{\circ}\text{C/W}$  maximum at  $t_H = 10\text{ms}$ .

FIGURE 8. Thermal impedance (MELF surface mount).

**Maximum Thermal Impedance Plots**  
**1N4153UB, 1N4534UB  $T_{SP} = 25^{\circ}C$**



$R_{\theta JSP} = 120^{\circ}C/W$

NOTE:  $Z_{\theta JX} = 90^{\circ}C/W$  maximum at  $t_H = 10ms$ .

FIGURE 9. Thermal impedance (UB versions).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

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.
- e. Destructive physical analysis when requested.

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 DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail [vqe.chief@dla.mil](mailto:vqe.chief@dla.mil). An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

6.4 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example JANHCA1N4153) will be identified on the QML.

JANC ordering information	
PIN	Manufacturer
	43611
1N4153	JANHCA1N4153, JANKCA1N4153
1N4534	JANHCA1N4534, JANKCA1N4534

MIL-PRF-19500/337L  
w/AMENDMENT 1

\* 6.5 Amendment notations. The margins of this specification are marked with asterisks to indicate modifications generated by this amendment. 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 - 85  
NASA - NA  
DLA - CC

Preparing activity:

DLA - CC

(Project 5961-2013-084)

Review activities:

Army - AR, MI, SM  
Navy - AS  
Air Force - 19

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 <https://assist.dla.mil> .