The documentation and process conversion measures necessary to comply with this document shall be completed by 6 October 2012.

INCH-POUND

MIL-PRF-19500/127W
6 July 2012
SUPERSEDING
MIL-PRF-19500/127V
18 May 2010

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICES, DIODE, SILICON, VOLTAGE REGULATOR,
TYPES 1N4370A-1 THROUGH 1N4372A-1 AND 1N746A-1 THROUGH 1N759A-1, 1N4370AUR-1 THROUGH 1N4372AUR-1 AND 1N746AUR-1 THROUGH 1N759AUR-1, 1N4370C-1 THROUGH 1N4372C-1 AND 1N746C-1 THROUGH 1N759C-1, 1N4370CUR-1 THROUGH 1N4372CUR-1 AND 1N746CUR-1 THROUGH 1N759CUR-1, 1N4370D-1 THROUGH 1N4372D-1 AND 1N746D-1 THROUGH 1N759D-1, 1N4370DUR-1 THROUGH 1N4372DUR-1 AND 1N746DUR-1 THROUGH 1N759DUR-1,
JAN, JANTX, JANTXV, JANHC, AND JANKC

JANS level (see 6.4).

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, voltage regulator diodes with voltage tolerances of 5, 2, and 1 percent. Three levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500. Two levels of product assurance is provided for each unencapsulated device.

* 1.2 Physical dimensions. See figure 1 (DO-35), figure 2 (DO-213AA), and figures 3, 4, and 5 for die.

1.3 Maximum ratings. Maximum ratings are as shown in maximum and primary test ratings (see 3.9 herein) and as follows:

* a. P_{TL} = 500 mW, (DO-35) at T_L = +50°C, L = .375 inch (9.53 mm); both ends of case or diode body to heat sink at L = .375 inch (9.53 mm). Derate I_Z to 0 at +175°C.

b. P_{TEC} = 500 mW, (DO-213AA) at T_{EC} = +125°C, derate to 0 at +175°C.
$-65°C \leq T_J \leq +175°C$;
$-65°C \leq TSTG \leq +175°C$.

c. $P_{T(PCB)}$ = 400 mW, T_A = 55°C.

* 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. 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 .

* 1.4 Primary electrical characteristics. Primary electrical characteristics are as shown in maximum and primary test ratings (see 3.9 herein) and as follows:

a. 2.4 V dc ≤ V_Z ≤ 12 V dc.

b. 1N4370A-1 through 1N4372A-1 and 1N746A-1 through 1N759A-1 are ±5 percent voltage tolerance.

c. 1N4370C-1 through 1N4372C-1 and 1N746C-1 through 1N759C-1 are ±2 percent voltage tolerance.

d. 1N4370D-1 through 1N4372D-1 and 1N746D-1 through 1N759D-1 are ±1 percent voltage tolerance.

Thermal resistance:
$R_{\Theta JL}$ = 250°C/W maximum at L = .375 inch (9.53 mm) (DO-35).
$R_{\Theta JEC}$ = 100°C/W maximum. Junction to end-caps (DO-213AA).
$R_{\Theta JA}$ = 300°C/W junction to ambient including PCB see note.

* NOTE: See figures 6, 7, and 8 for derating curves. T_A = +75°C for both axial and MELF (UR) on printed circuit board (PCB), PCB = FR4 .0625 inch (1.59 mm) 1-layer 1-Oz Cu, horizontal, still air, pads (UR) = .067 inch (1.70 mm) x .105 inch (2.67 mm); pads (axial) = .092 inch (2.34 mm) diameter, strip = .030 inch (0.762 mm) x 1 inch (25.4 mm) long, axial lead length L ≤ .187 inch (≤ 4.75 mm); $R_{\Theta JA}$ with a defined thermal resistance condition included is measured at I_Z = as defined in the electrical characteristics table herein.

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

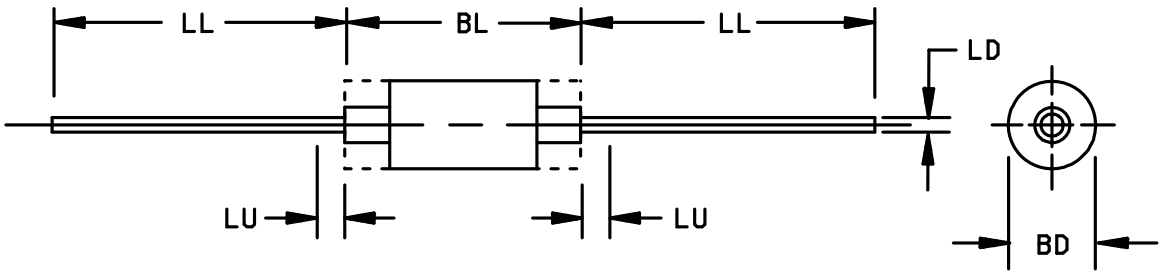
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

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

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

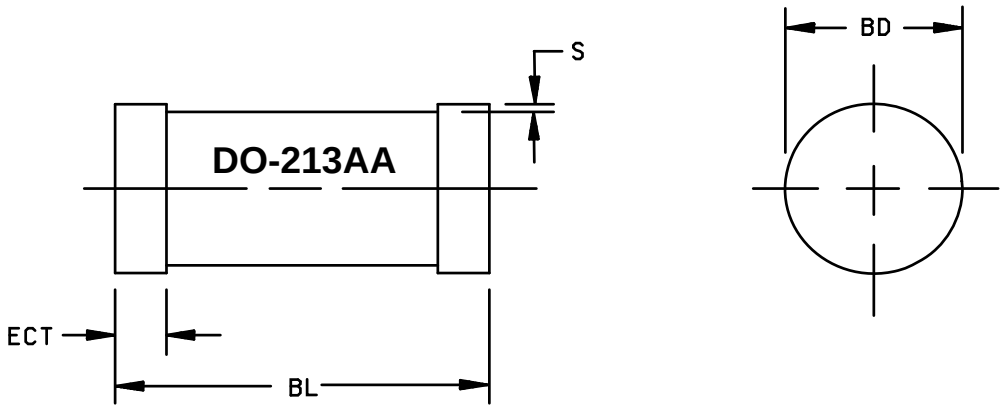
2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific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



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.055	.090	1.40	2.29	3
BL	.120	.200	3.05	5.08	4
LD	.018	.023	0.46	0.58	
LL	1.000	1.500	25.40	38.10	
LU		.050		1.27	5

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. The BL dimension shall include the entire body including slugs.
5. Dimension LU shall include the sections of the lead over which the diameter is uncontrolled. This uncontrolled area is defined as the zone between the edge of the diode body and extending .050 inch (1.27 mm) onto the leads.
6. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

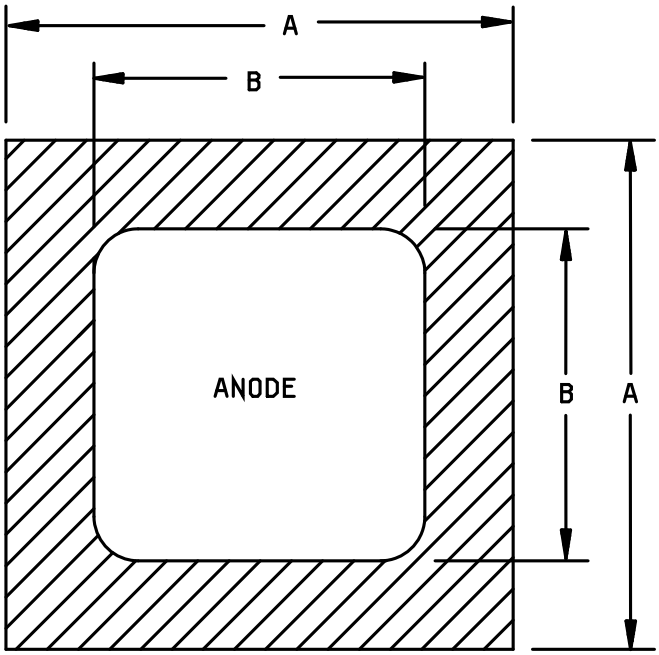
FIGURE 1. Physical dimensions for types 1N4370A-1 through 1N4372A-1, 1N4370C-1 through 1N4372C-1, 1N4370D-1 through 1N4372D-1, 1N746A-1 through 1N759A-1, 1N746C-1 through 1N759C-1, and 1N746D-1 through 1N759D-1 (DO-35).



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.130	.146	3.30	3.71
BD	.063	.067	1.60	1.71
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. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

FIGURE 2. Physical dimensions for types 1N4370AUR-1 through 1N4372AUR-1, 1N4370CUR-1 through 1N4372CUR-1, 1N4370DUR-1 through 1N4372DUR-1, 1N746AUR-1 through 1N759AUR-1, 1N746CUR-1 through 1N759CUR-1, and 1N746DUR-1 through 1N759DUR-1 (DO-213AA).



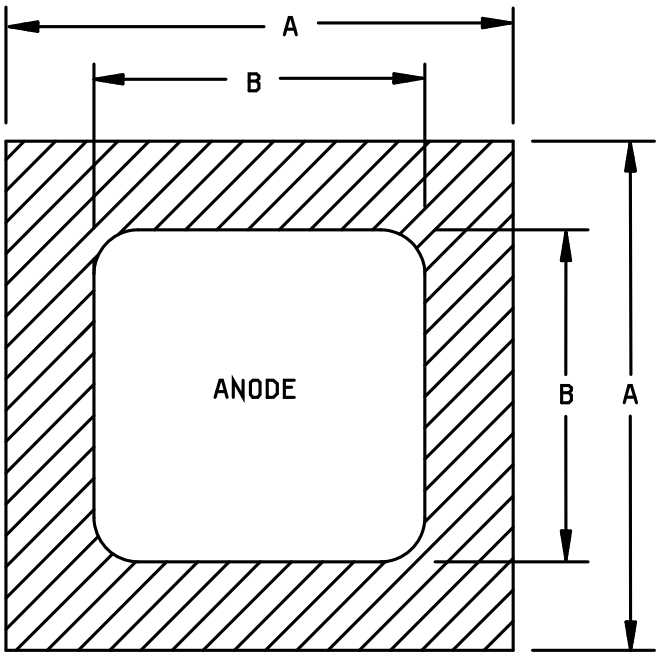
BACKSIDE IS CATHODE

(A – version)

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.021	.025	0.53	0.63
B	.013	.017	0.33	0.43

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The physical characteristics of the die thickness are .010 ±.002 (0.25 mm ±0.051 mm).
   Metallization is top = (anode)-AL, back: (cathode)-AU.
   AL thickness = 25,000 Å minimum,
   AU thickness = 4,000 Å minimum.

FIGURE 3. Physical dimensions (JANHCA and JANKCA die dimensions).



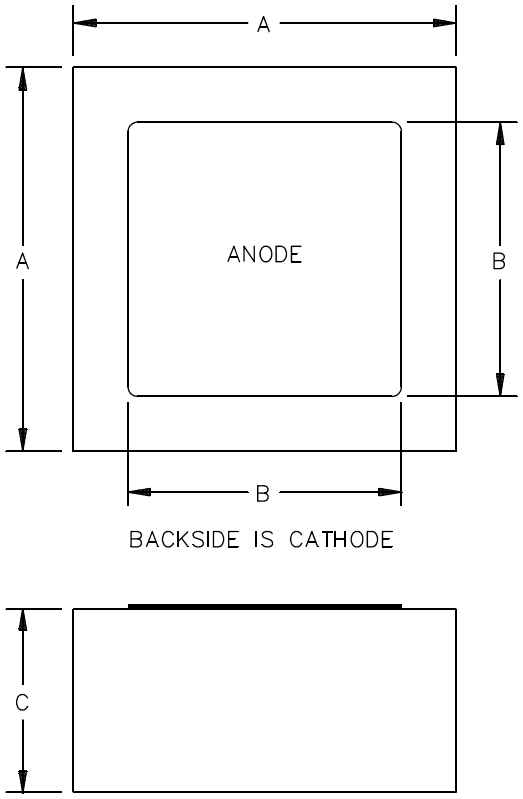
BACKSIDE IS CATHODE

(B – version)

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.024	.028	0.61	0.71
B	.017	.021	0.43	0.53

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The physical characteristics of the die thickness are .010 ±.002 (0.25 mm ±0.051 mm).
   Metallization is top = (anode)-AL, back: (cathode)-AU.
   AL thickness = 40,000 Å minimum,
   AU thickness = 5,000 Å minimum.
4. Circuit layout data: For zener operation, cathode must be operated positive with respect to anode.

FIGURE 4. Physical dimensions (JANHCB and JANKCB die dimensions).



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.019	.023	0.48	0.58
B	.013	.017	0.33	0.43
C	.008	.012	0.20	0.30

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. Element evaluation accomplished utilizing TO-5 package.
3. The physical characteristics of the die thickness are .010 ±.002 (0.25 mm ±0.05 mm).
   Metallization is top = (anode) - AL, back: (cathode) - AU
   AL thickness = 25,000 Å minimum.
   AU thickness = 4,000 Å minimum.

* FIGURE 5. Physical dimensions, JANHCC and JANKCC 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 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 are defined in MIL-PRF-19500, and as follows.

EC - end-caps

* 3.4 Interface and physical dimensions. The interface and physical dimensions shall be specified in MIL-PRF-19500 and figures 1 and 2 (DO-35 and DO-213AA), and figures 3, 4, and 5 (die) herein.

3.4.1 Lead finish. Lead finish shall be solderable as defined in 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 metallurgically bonded double plug construction in accordance with the requirements of category I, II, or III (see MIL-PRF-19500).

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 can be abbreviated as J, JX, and JV, respectively. (example: The part number can be reduced to J746B1) 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 3 contrasting dots around the periphery of the cathode.

3.6 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 groups A, B, and C testing as 5 percent tolerance devices. All sublots of C and D suffix devices shall pass table I, subgroup 2, at tightened tolerances. Tighter tolerances for mounting clip temperature shall be maintained for reference purpose to establish correlation. For C and D tolerance levels, T_L = +25°C ±2°C at .375 inch (9.53 mm) from body, or zero inches for surface mount devices or equivalent.

3.7 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, tables I, II, and table III.

3.8 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I herein.

3.9 Maximum and primary test ratings. Maximum and primary test ratings for voltage regulator diodes are specified in table IV herein.

3.10 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 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 request 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.

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

4.2.3 Construction verification. Cross sectional photos from three devices shall be submitted in the qualification report.

4.3 Screening (JAN, JANTX, and JANTXV levels only). Screening shall be in accordance with table E-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.

Screen (see table E-IV of MIL-PRF-19500)	Measurement
	JANTX and JANTXV levels
3a	Temperature cycling
(1) 3c	Thermal impedance (see 4.3.2)
7a 7b	Not applicable Optional
9	Not applicable
11	I_{R1} and V_{Z2}
12	See 4.3.3
(2) 13	$\Delta I_{R1} \leq$ 100 percent of initial reading or 50 nA dc, whichever is greater. $\Delta V_{Z2} \leq \pm 2$ percent initial reading. Subgroup 2 of table I herein.
14a (3) 14b	Not applicable Required

(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) PDA = 5 percent for screen 13 applies to ΔI_{R1} and ΔV_{Z2}, and I_{R1} and V_{Z2}. Thermal impedance ($Z_{\Theta JX}$) is not required in screen 13 of 4.3 herein.
(3) For clear glass diodes, the hermetic seal (gross leak) may be performed at anytime after temperature cycling.

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

4.3.1.1 JAN product. JAN product will have temperature cycling and thermal impedance testing performed in accordance with MIL-PRF-19500, JANTX level screening requirements.

* 4.3.2 Thermal impedance. 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_M, I_H, t_H, t_{MD} (and V_C where appropriate). (See figures 9 through 11.) Measurement delay time (t_{MD}) = 70 μs max. See table II, subgroup 4 herein. See figure 12 for mounting conditions.

4.3.3 Power burn-in conditions. Power burn-in conditions are as follows (see 4.5.5): $I_{Z(min)}$ = column 8 of table IV herein. T_A = 75°C maximum. 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. T_J = 125°C minimum. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, T_J, 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.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein. Group A inspection shall be performed on each sublot.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I 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 the applicable inspections of table I, subgroup 2 herein. ($Z_{\Theta JX}$ applies to B2 and B3 only).

4.4.2.1 Group B inspection, table E-VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
B2	1056	0°C to +100°C, 10 cycles.
B2	1051	-55°C to +175°C, 25 cycles.
B2	4066	See 4.5.1.
B3	1027	$I_{Z(min)}$ = Column 8 of table IV minimum. Adjust I_{ZM} or T_A to ensure a T_J = 150°C (minimum) (see 4.5.5).
B4	2075	As applicable.
B4	2101	Decap analysis, scribe and break only.
B6	1032	T_A = 175°C.

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. ($Z_{\Theta JX}$ applies to C2 and C6 only).

Subgroup	Method	Condition
C2	1056	0°C to +100°C, 10 cycles.
C2	1051	-55°C to +175°C, 25 cycles.
C2	2036	Tension: Test condition A; weight = 10 pounds, t = 15 seconds. Lead fatigue: Test condition E. (Tension and lead fatigue are not required for UR-1 suffix devices).
C2	1071	Test condition E.
C3		Not applicable.
C5	4081	See 4.3.2 herein.
C6	1027	$I_{Z(min)}$ = Column 8 of table IV minimum. Adjust I_{ZM} or T_A to ensure a T_J = 150°C (minimum) (see 4.5.5).
C7		Not applicable.
C8	4071	I_Z = 7.5 mA dc, T1 = +25°C ±5°C, T2 = +125°C ±5°C. (Max limit in accordance with columns 13 and 14 of table IV). Sample size = 22, 0 rejects allowed.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the 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 the applicable inspections of 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 Surge current (I_{ZSM}). The peak currents shown in column 10 of table IV shall be applied in the reverse direction and these shall be imposed on the current (I_Z = 20 mA dc) a total of 5 surges at 1 minute intervals. Each individual surge shall be one-half square-wave-pulse of one one-hundred twenty second duration or an equivalent one-half sine wave with the same effective rms current. T_A = +25°C ±5°C.

4.5.2 Regulator voltage measurements. The test current shall be applied until thermal equilibrium is attained (20 ±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 (UR version = 0 lead length) and the mounting clips shall be maintained at a temperature of +25°C +8°C, and -2°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. JANHC and JANKC shall be pulse tested at 10 ms maximum.

4.5.3 Voltage regulation V_Z (reg). Voltage regulation shall be determined by the difference of the regulator voltage measured at different currents as specified in table I, subgroup 7. Both tests shall be performed at thermal equilibrium. This ΔV_Z shall not exceed column 7 of table IV.

4.5.4 Temperature coefficient of regulator voltage (α_{VZ}). The device shall be temperature stabilized with current applied prior to reading regulator voltage at the specified ambient temperature as specified in 4.4.3 herein, group C, subgroup 8.

4.5.5 Free air burn-in and life tests. The use of a current limiting or ballast resistor is permitted provided that each DUT still sees at least the $I_{Z(minimum)}$ described in 4.3.2 and that the minimum applied voltage, where applicable, is maintained throughout the burn-in period. Use method 3100 of MIL-STD-750 to measure T_J.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits 2/		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Forward voltage	4011	I_F = 200 mA dc	V_F		1.1	V dc
Reverse current	4016	DC method, V_R = column 11 of table IV	I_{R1}		Col. 12	µA dc
Regulator voltage	4022	I_{Z1} = 250 µA dc (see 4.5.2)	V_{Z1}	Col. 9	Col. 4	V dc
Regulator voltage	4022	I_{Z2} = 20 mA dc (see 4.5.2)	V_{Z2}	Col. 3	Col. 4	V dc
Thermal impedance -1 suffix	3101	See 4.3.2, not applicable for JANHC and JANKC	$Z_{\Theta JX}$			°C/W
Subgroup 3						
High temperature operation		T_A = 150°C				
Reverse current	4016	DC method, V_R = column 11 of table IV	I_{R2}		Col. 5	µA dc
Subgroup 4						
Small-signal reverse breakdown impedance	4051	I_Z = 20 mA dc, I_{SIG} = 10 percent of I_Z ac	Z_Z		Col. 6	ohm
Subgroups 5						
Not applicable						

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits 2/		Unit
	Method	Conditions		Min	Max	
Subgroup 6						
Surge	4066	See 4.5.1				
Electrical measurements		See table I, subgroup 2				
Subgroup 7						
Voltage regulation (see 4.5.3)		I_{Z3} = 2 mA dc; I_{Z4} = 20 mA dc	V_Z (reg)		Col. 7	V dc

1/ For sampling plan, see MIL-PRF-19500.
2/ Column references are to table IV.

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

Inspection	MIL-STD-750		Qualification, conformance inspection (sampling plan)
	Method	Conditions	
Subgroup 1			45 devices, c = 0
Temperature cycling	1051	500 cycles, -55°C to +175°C	
Hermetic seal	1071		
Electrical measurements		See table I, subgroup 2 and table III, step 1	
Subgroup 2			22 devices, c = 0
Intermittent operation life	1037	6,000 cycles. I_Z = column 8 of table IV	
Electrical measurements		See table I, subgroup 2 and table III, step 1. Provide read and record $\Delta Z_{\Theta JX}$ data to the qualifying activity.	
Subgroup 4			N/A
Thermal impedance curves		See MIL-PRF-19500	
Subgroups 5 and 6			
Not applicable			
Subgroup 8			45 devices
Resistance to glass cracking	1057	Condition B. Cool down after solder immersion is permitted. Test until failure occurs on all devices with the chosen sample or to a maximum of 25 cycles, whichever comes first.	

TABLE III. Group B, C, and E delta requirements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Thermal impedance	3101	See 4.3.2	$\Delta Z_{\Theta JX}$		±10 percent of initial value	°C/W

1/ The electrical measurements for table E-VIb of MIL-PRF-19500 are as follows:
Subgroup 2, see table III herein, step 1.
Subgroup 3, see table III herein, step 1.
2/ The electrical measurements for table E-VII of MIL-PRF-19500 are as follows:
Subgroup 2, see table III herein, step 1.
Subgroup 6, see table III herein, step 1.
3/ The electrical measurements for table E-IX of MIL-PRF-19500 are as follows:
Subgroup 1, see table III herein, step 1.
Subgroup 2, see table III herein, step 1.

TABLE IV. Electrical characteristics (5 percent tolerance diodes).

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	Col 14
Type	V_{Z2} nom at I_Z = 20 mA	V_{Z2} Min	V_{Z1} and V_{Z2} max	I_{R2} at T_A = 150°C V_R = col 11	Z_Z at I_Z =20 mA	$V_{Z(reg)}$	I_{ZM}	$V_{Z1(min)}$ Z_{ZK}	I_{ZSM}	V_R	I_{R1} at T_A = 25°C V_R = col 11	α_{VZ}	αVZ pos. limit
1N4370A-1	2.4	2.28	2.52	200	30	1.0	155	1.1	1000	1.0	100	-0.085	0
1N4371A-1	2.7	2.57	2.83	150	30	1.0	140	1.2	1000	1.0	60	-0.080	0
1N4372A-1	3.0	2.85	3.15	100	29	1.0	125	1.3	1000	1.0	30	-0.075	0
1N746A-1	3.3	3.14	3.46	30	24	1.0	120	1.5	1000	1.0	5	-0.070	0
1N747A-1	3.6	3.42	3.78	30	22	1.0	110	1.8	1000	1.0	3	-0.065	0
1N748A-1	3.9	3.71	4.09	30	20	1.0	100	2.0	1000	1.0	2	-0.060	0
1N749A-1	4.3	4.09	4.51	50	18	1.0	90	2.4	990	1.0	2	-0.055	+.020
1N750A-1	4.7	4.47	4.93	50	15	1.0	85	2.8	980	1.5	5	-0.043	+.025
1N751A-1	5.1	4.85	5.35	50	14	0.8	75	3.3	960	2.0	5	-0.030	+.030
1N752A-1	5.6	5.32	5.88	50	8	0.8	70	4.3	950	2.5	5	-0.028	+.036
1N753A-1	6.2	5.89	6.51	50	3	0.6	65	5.2	910	3.5	5	0	+.045
1N754A-1	6.8	6.46	7.14	50	3	0.4	60	6.0	870	4.0	2	0	+.050
1N755A-1	7.5	7.13	7.87	50	4	0.4	55	6.6	810	5.0	2	0	+.058
1N756A-1	8.2	7.79	8.61	50	5	0.4	50	7.5	740	6.0	1	0	+.062
1N757A-1	9.1	8.65	9.55	50	6	0.5	45	8.4	650	7.0	1	0	+.068
1N758A-1	10.0	9.50	10.50	50	7	0.7	40	9.1	540	8.0	1	0	+.076
1N759A-1	12.0	11.40	12.60	50	10	1.0	35	11.0	400	9.0	1	0	+.080

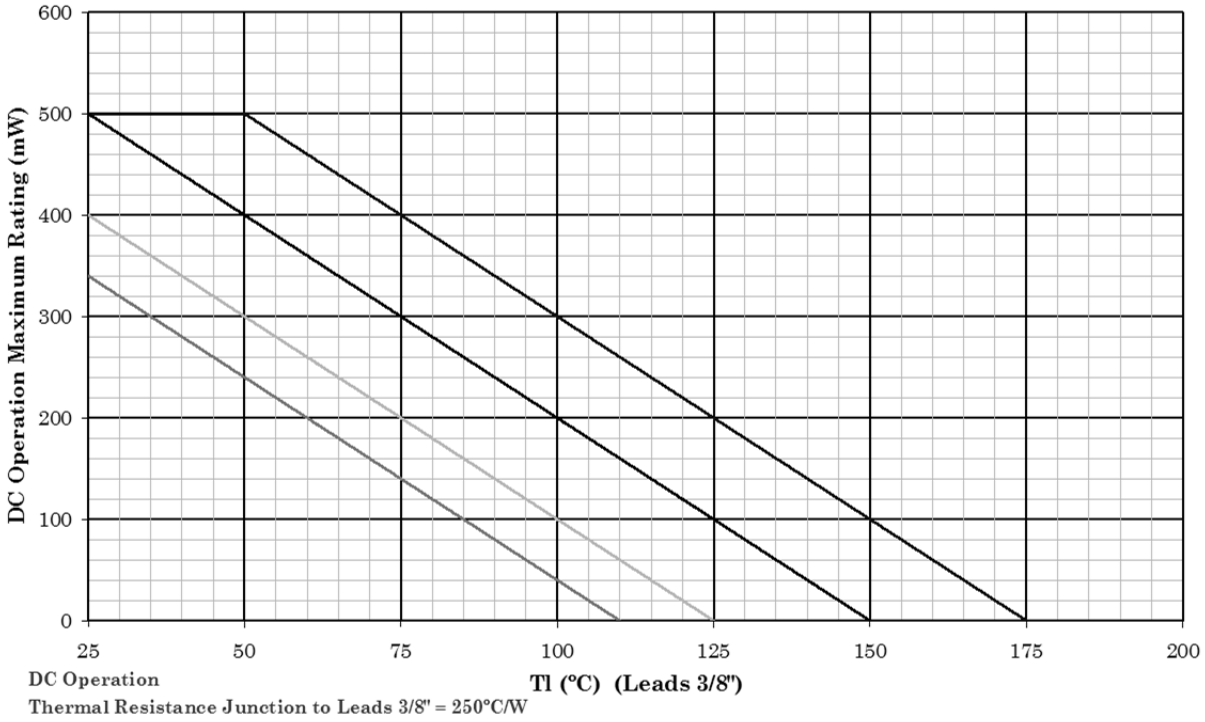
TABLE IV. Electrical characteristics (2 percent tolerance diodes) - Continued.

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	Col 14
Type	V_{Z2} nom at I_Z = 20 mA	V_{Z2} min	V_{Z1} and V_{Z2} max	I_{R2} at T_A = 150°C V_R = col 11	Z_Z at I_Z = 20 mA	$V_{Z(reg)}$	I_{ZM}	$V_{Z1(min)}$ Z_{ZK}	I_{ZSM}	V_R	I_{R1} at T_A = 25°C V_R = col 11	α_{VZ}	αVZ pos. limit
1N4370C-1	2.4	2.352	2.448	200	30	1.0	155	1.1	1000	1.0	100	-0.085	0
1N4371C-1	2.7	2.646	2.754	150	30	1.0	140	1.2	1000	1.0	60	-0.080	0
1N4372C-1	3.0	2.94	3.06	100	29	1.0	125	1.3	1000	1.0	30	-0.075	0
1N746C-1	3.3	3.234	3.366	30	24	1.0	120	1.5	1000	1.0	5	-0.070	0
1N747C-1	3.6	3.528	3.672	30	22	1.0	110	1.8	1000	1.0	3	-0.065	0
1N748C-1	3.9	3.822	3.978	30	20	1.0	100	2.0	1000	1.0	2	-0.060	0
1N749C-1	4.3	4.214	4.386	50	18	1.0	90	2.4	990	1.0	2	-0.055	+.020
1N750C-1	4.7	4.606	4.794	50	15	1.0	85	2.8	980	1.5	5	-0.043	+.025
1N751C-1	5.1	4.998	5.202	50	14	0.8	75	3.3	960	2.0	5	-0.030	+.030
1N752C-1	5.6	5.488	5.712	50	8	0.8	70	4.3	950	2.5	5	-0.028	+.036
1N753C-1	6.2	6.076	6.324	50	3	0.6	65	5.2	910	3.5	5	0	+.045
1N754C-1	6.8	6.664	6.936	50	3	0.4	60	6.0	870	4.0	2	0	+.050
1N755C-1	7.5	7.357	7.650	50	4	0.4	55	6.6	810	5.0	2	0	+.058
1N756C-1	8.2	8.036	8.364	50	5	0.4	50	7.5	740	6.0	1	0	+.062
1N757C-1	9.1	8.918	9.282	50	6	0.5	45	8.4	650	7.0	1	0	+.068
1N758C-1	10.0	9.80	10.20	50	7	0.7	40	9.1	540	8.0	1	0	+.076
1N759C-1	12.0	11.76	12.24	50	10	1.0	35	11.0	400	9.0	1	0	+.080

TABLE IV. Electrical characteristics (1 percent tolerance diodes) - Continued.

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	Col 14
Type	V_{Z2} nom at I_Z = 20 mA	V_{Z2} min	V_{Z1} and V_{Z2} max	I_{R2} at T_A = 150°C V_R = col 11	Z_Z at I_Z = 20 mA	$V_{Z(reg)}$	I_{ZM}	$V_{Z1(min)}$ Z_{ZK}	I_{ZSM}	V_R	I_{R1} at T_A = 25°C V_R = col 11	α_{VZ}	αVZ pos. limit
1N4370D-1	2.4	2.376	2.424	200	30	1.0	155	1.1	1000	1.0	100	-0.085	0
1N4371D-1	2.7	2.673	2.727	150	30	1.0	140	1.2	1000	1.0	60	-0.080	0
1N4372D-1	3.0	2.970	3.030	100	29	1.0	125	1.3	1000	1.0	30	-0.075	0
1N746D-1	3.3	3.267	3.333	30	24	1.0	120	1.5	1000	1.0	5	-0.070	0
1N747D-1	3.6	3.564	3.636	30	22	1.0	110	1.8	1000	1.0	3	-0.065	0
1N748D-1	3.9	3.861	3.939	30	20	1.0	100	2.0	1000	1.0	2	-0.060	0
1N749D-1	4.3	4.257	4.343	50	18	1.0	90	2.4	990	1.0	2	-0.055	+.020
1N750D-1	4.7	4.653	4.747	50	15	1.0	85	2.8	980	1.5	5	-0.043	+.025
1N751D-1	5.1	5.049	5.151	50	14	0.8	75	3.3	960	2.0	5	-0.030	+.030
1N752D-1	5.6	5.544	5.656	50	8	0.8	70	4.3	950	2.5	5	-0.028	+.036
1N753D-1	6.2	6.138	6.262	50	3	0.6	65	5.2	910	3.5	5	0	+.045
1N754D-1	6.8	6.732	6.868	50	3	0.4	60	6.0	870	4.0	2	0	+.050
1N755D-1	7.5	7.425	7.575	50	4	0.4	55	6.6	810	5.0	2	0	+.058
1N756D-1	8.2	8.118	8.282	50	5	0.4	50	7.5	740	6.0	1	0	+.062
1N757D-1	9.1	9.009	9.191	50	6	0.5	45	8.4	650	7.0	1	0	+.068
1N758D-1	10.0	9.90	10.10	50	7	0.7	40	9.1	540	8.0	1	0	+.076
1N759D-1	12.0	11.88	12.12	50	10	1.0	35	11.0	400	9.0	1	0	+.080

TEMPERATURE-POWER DERATING CURVE
DO-35

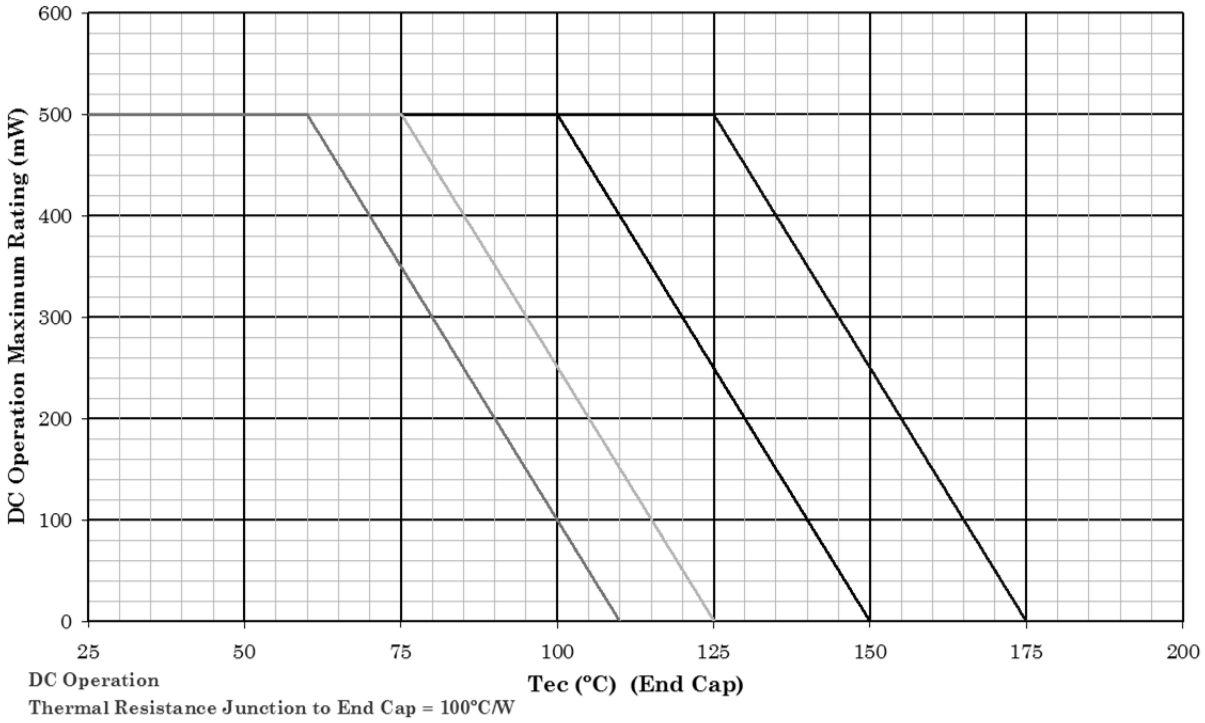


NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating at ≤ 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 ≤ 175°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ 150°C, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at T_J ≤ 125°C, and 110°C to show power rating where most users want to limit T_J in their application.

* FIGURE 6. Temperature-power derating curve (junction to lead).

TEMPERATURE-POWER DERATING CURVE
DO-213AA

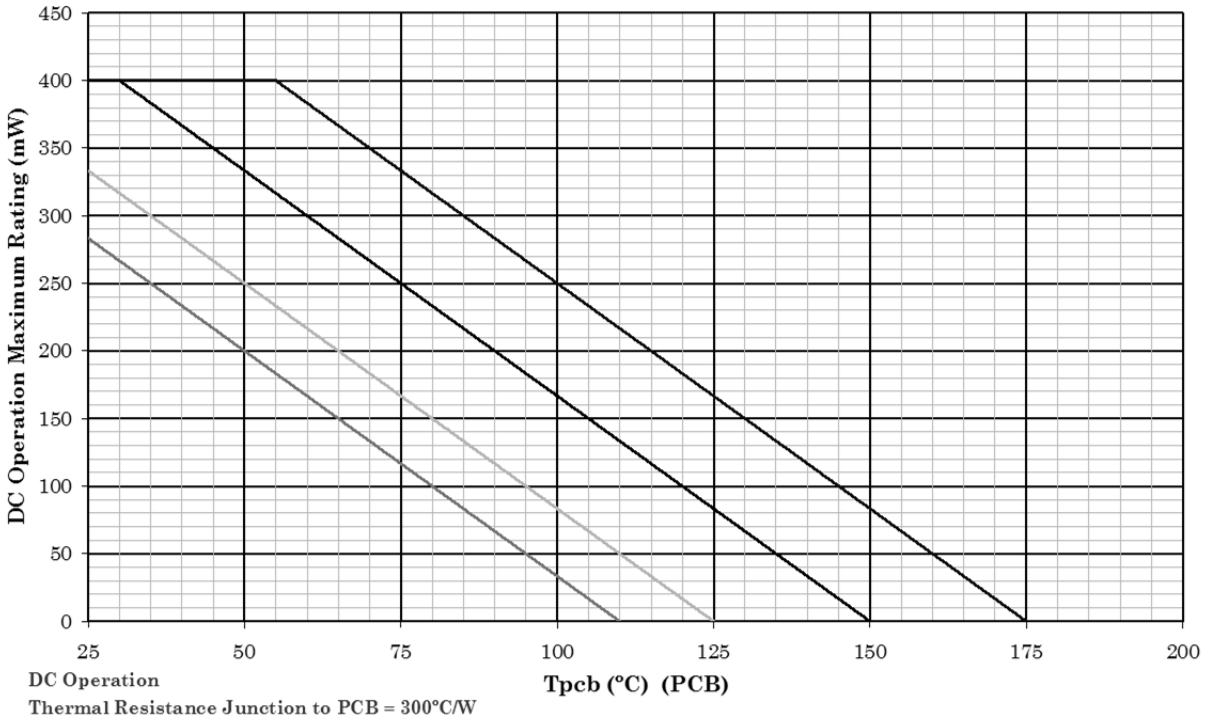


NOTES:

1. This is the true inverse of the worst case thermal resistance value. 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 ($T_J \leq 175°C$) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at $T_J \leq 150°C$, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at T $\leq 125°C$, and 110°C to show power rating where most users want to limit T_J in their application.

* FIGURE 7. Temperature-power derating curve (junction to end-cap).

TEMPERATURE-POWER DERATING CURVE
DO-35

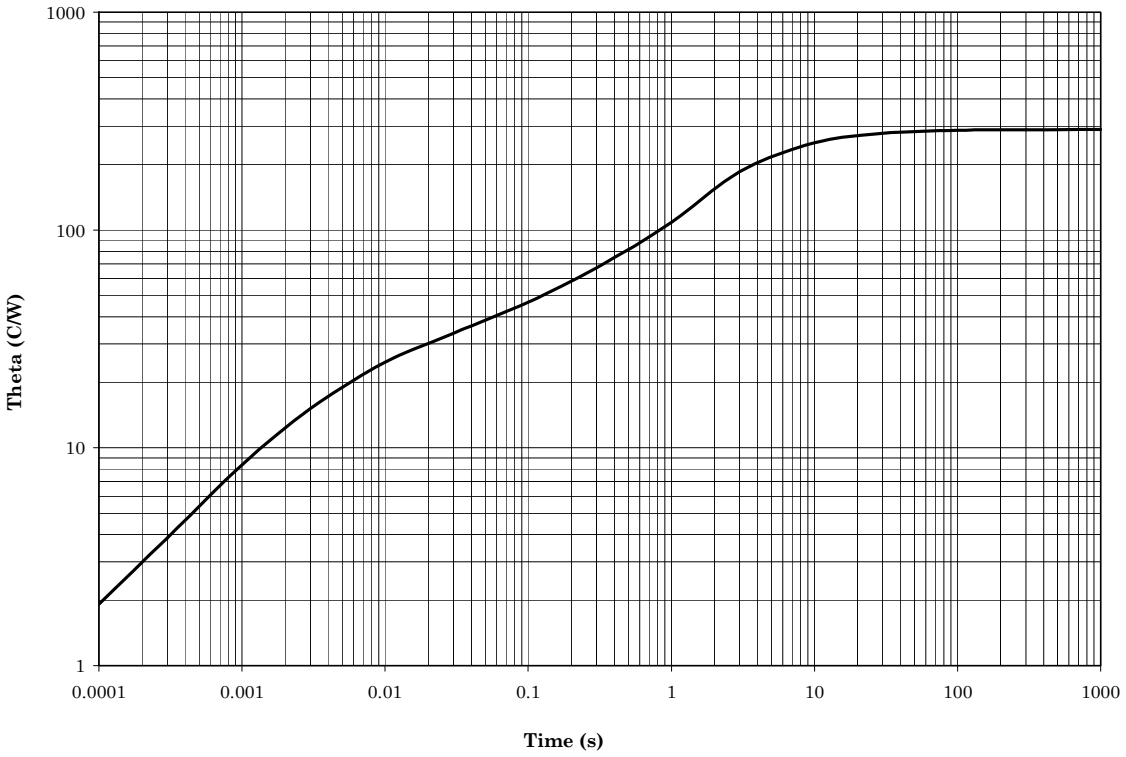


NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating at ≤ 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 ≤ 175°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ 150°C, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at T_J ≤, 125°C, and 110°C to show power rating where most users want to limit T_J in their application.

* FIGURE 8. Temperature-power derating curve (junction to PCB).

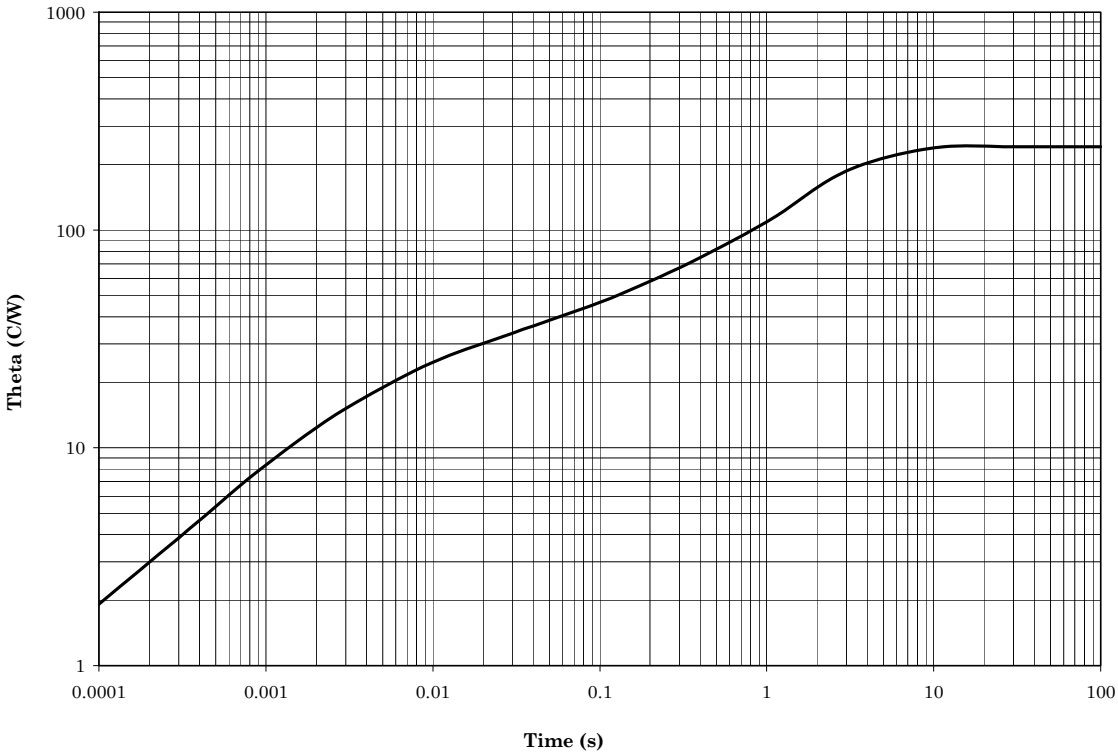
THERMAL IMPEDANCE
PCB



Mount, FR4, 1oz Cu, 50 x 87 mil pad (MELF) and 92 mil diameter (axial width .125 inch (3.18 mm) lead length) at T_A =25°C.
Thermal resistance = 300°C/W. Maximum power rating = 400 mW at T_A =55°C.

* FIGURE 9. Thermal impedance DO-35 (PCB mount, FR4).

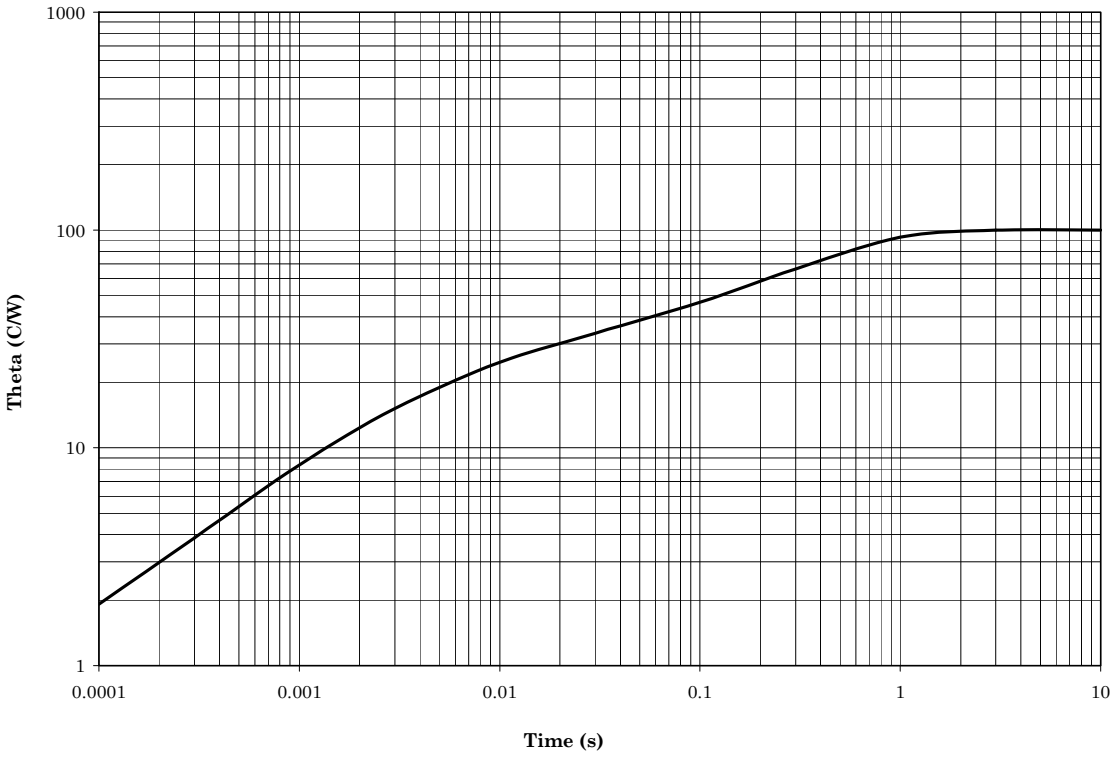
THERMAL IMPEDANCE
DO-35



T_L = 25°C at .375 inch (9.53 mm) from body.
Thermal resistance = 250°C/W. Maximum power rating = 500 mW at T_L = 50°C.

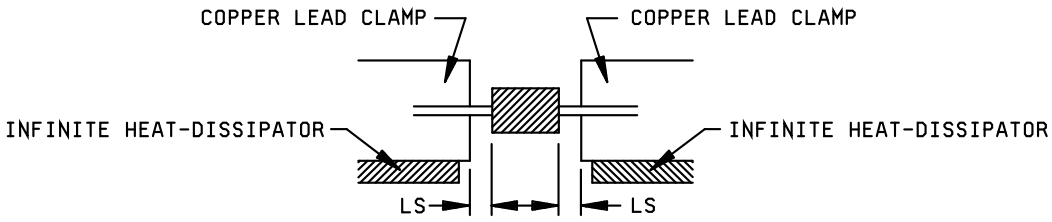
* FIGURE 10. Thermal impedance DO-35 axial leaded.

THERMAL IMPEDANCE
DO-213AA



Thermal resistance = 100°C/W. Power rating = 500 mW at T_{EC} = 125°C.

* FIGURE 11. Thermal impedance DO-35 MELF.



* FIGURE 12. Mounting conditions.

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.

* 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. 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 Cross reference substitution list. Devices required for space flight applications are found in MIL-PRF-19500/533. Existing supplies of parts can be used until existing supplies are exhausted. A PIN for PIN replacement table follows and these devices are directly interchangeable.

JANS superseded PIN	JANS superseding PIN
1N4370A-1, C-1 or D-1	1N6309, C, D
1N4371A-1, C-1 or D-1	1N6310, C, D
1N4372A-1, C-1 or D-1	1N6311, C, D
1N746A-1, C-1 or D-1	1N6312, C, D
1N747A-1, C-1 or D-1	1N6313, C, D
1N748A-1, C-1 or D-1	1N6314, C, D
1N749A-1, C-1 or D-1	1N6315, C, D
1N750A-1, C-1 or D-1	1N6316, C, D
1N751A-1, C-1 or D-1	1N6317, C, D

JANS superseded PIN	JANS superseding PIN
1N752A-1, C-1 or D-1	1N6318, C, D
1N753A-1, C-1 or D-1	1N6319, C, D
1N754A-1, C-1 or D-1	1N6320, C, D
1N755A-1, C-1 or D-1	1N6321, C, D
1N756A-1, C-1 or D-1	1N6322, C, D
1N757A-1, C-1 or D-1	1N6323, C, D
1N758A-1, C-1 or D-1	1N6324, C, D
1N759A-1, C-1 or D-1	1N6326, C, D

6.4.1 Substitutability of dash-one parts. Non-dash-one devices have been deleted from this specification. Dash-one devices are a direct substitute for non dash-one devices and are preferred. The following table shows the direct substitutability.

Superseded PIN	Superseding PIN		Superseded PIN	Superseding PIN
1N4370A	1N4370A-1		1N752A	1N752A-1
1N4371A	1N4371A-1		1N753A	1N753A-1
1N4372A	1N4372A-1		1N754A	1N754A-1
1N746A	1N746A-1		1N755A	1N755A-1
1N747A	1N747A-1		1N756A	1N756A-1
1N748A	1N748A-1		1N757A	1N757A-1
1N749A	1N749A-1		1N758A	1N758A-1
1N750A	1N750A-1		1N759A	1N759A-1
1N751A	1N751A-1			

6.4.2 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: JANTX1N4370D-1 substitutes for JANTX1N4370A-1).

* 6.5 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC die suppliers with the applicable letter version (example JANHCA1N4370A) will be identified on the QML.

JANHC ordering information (1) (2)			
PIN	Manufacture CAGE		
	43611	12954	52GC4
1N4370	JANHCA1N4370	JANHCB1N4370	JANHCC1N4370
1N4371	JANHCA1N4371	JANHCB1N4371	JANHCC1N4371
1N4372	JANHCA1N4372	JANHCB1N4372	JANHCC1N4372
1N746	JANHCA1N746	JANHCB1N746	JANHCC1N746
1N747	JANHCA1N747	JANHCB1N747	JANHCC1N747
1N748	JANHCA1N748	JANHCB1N748	JANHCC1N748
1N749	JANHCA1N749	JANHCB1N749	JANHCC1N749
1N750	JANHCA1N750	JANHCB1N750	JANHCC1N750
1N751	JANHCA1N751	JANHCB1N751	JANHCC1N751
1N752	JANHCA1N752	JANHCB1N752	JANHCC1N752
1N753	JANHCA1N753	JANHCB1N753	JANHCC1N753
1N754	JANHCA1N754	JANHCB1N754	JANHCC1N754
1N755	JANHCA1N755	JANHCB1N755	JANHCC1N755
1N756	JANHCA1N756	JANHCB1N756	JANHCC1N756
1N757	JANHCA1N757	JANHCB1N757	JANHCC1N757
1N758	JANHCA1N758	JANHCB1N758	JANHCC1N758
1N759	JANHCA1N759	JANHCB1N759	JANHCC1N759

(1) Suffixes can be “A”, ”C”, or “D”.
(2) Replace “HC” with “KC” when ordering JANKC die.

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 - 85
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

(Project 5961-2012-062)

Review activities:
Army - AR, AV, MI, SM
Navy - AS, MC
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 https://assist.dla.mil .