

The documentation and process conversion measures necessary to comply with this revision shall be completed by 20 December 2011.

INCH-POUND

MIL-PRF-19500/304E
 20 September 2011
 SUPERSEDING
 MIL-PRF-19500/304D
 15 August 1999

* PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER, FAST RECOVERY
 TYPES 1N3885, 1N3886, 1N3888, 1N3890, 1N3891, 1N3893,
 1N3890R, 1N3891R, 1N3893R, AND A-VERSIONS,
 JAN, JANTX, JANTXV, JANS, 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 12 and 20 ampere, silicon fast recovery, power, rectifier diodes. Four 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.

1.2 Physical dimensions. See figures 1, 2 (DO-4), and 3 (die).

1.3 Maximum ratings. $T_C = 25^\circ\text{C}$ unless otherwise specified.

Type	V_R	V_{RWM}	I_O (1) $T_C = 100^\circ\text{C}$	I_{FSM} $T_C = 100^\circ\text{C}$ $t = 1/120 \text{ s}$	t_{rr}	T_C
	<u>V</u>	<u>V (pk)</u>	<u>A dc</u>	<u>A (pk)</u>	<u>ns</u>	<u>$^\circ\text{C}$</u>
1N3885	100	100	12	150	200	-65 to +150
1N3885A	100	100	20	225	150	-65 to +150
1N3890, R	100	100	12	175	200	-65 to +150
1N3890A, AR	100	100	20	250	150	-65 to +150
1N3886	200	200	12	150	200	-65 to +150
1N3886A	200	200	20	225	150	-65 to +150
1N3891, R	200	200	12	175	200	-65 to +150
1N3891A, AR	200	200	20	250	150	-65 to +150
1N3888	400	400	12	150	200	-65 to +150
1N3888A	400	400	20	225	150	-65 to +150
1N3893, R	400	400	12	175	200	-65 to +150
1N3893A, AR	400	400	20	250	150	-65 to +150

(1) Derate linearly 2 percent of $I_O / ^\circ\text{C}$ for $T_C > 100^\circ\text{C}$, see figure 4.

Storage temperature: $T_C = -65^\circ\text{C}$ to $+150^\circ\text{C}$ for 1N3885, 1N3886, 1N3888 and A versions.

Storage temperature: $T_C = -65^\circ\text{C}$ to $+175^\circ\text{C}$ for 1N3890, 1N3891, 1N3893 and A, R, AR versions.

Barometric pressure reduced: 15 mmHg.

* 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.daps.dla.mil>.

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1.4 Primary electrical characteristics. $T_C = 25^\circ\text{C}$ unless otherwise specified.

Type	I_{R1}		I_{R2} $T_A = +150^\circ\text{C}$	
	VR (V dc)	$\mu\text{A dc}$	VR (V dc)	mA dc
1N3885, A, 1N3890, A, 1N3890R, AR	100	10.0	100	2
1N3886, A, 1N3891, A, 1N3891R, AR	200	10.0	200	2
1N3888, A, 1N3893, A, 1N3893R, AR	400	10.0	400	2

Type	$R_{\theta JC}$ °C/W
Isolated non - A	3.0
Isolated A	2.5
Non isolated non - A	2.0
Non isolated A	1.5 (1)

(1) See [figure 5](#) for thermal impedance curves.

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 documents cited in section 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

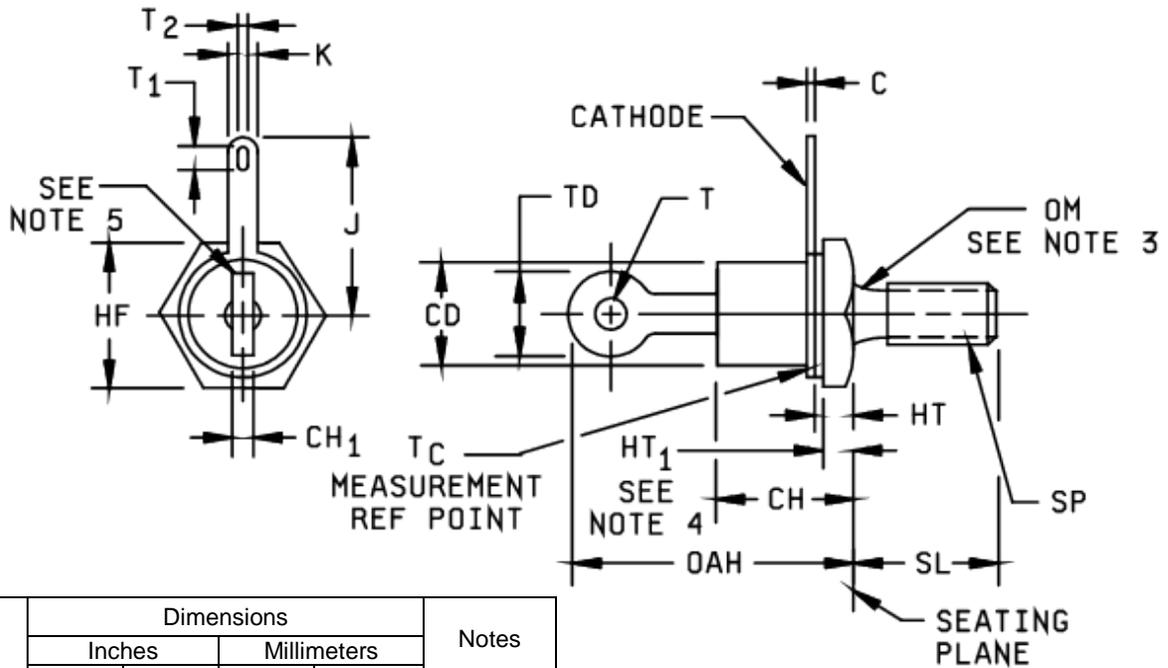
[MIL-PRF-19500](#) - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-750](#) - Test Methods for Semiconductor Devices.

* (Copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch/> or <https://assist.daps.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 specification 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.

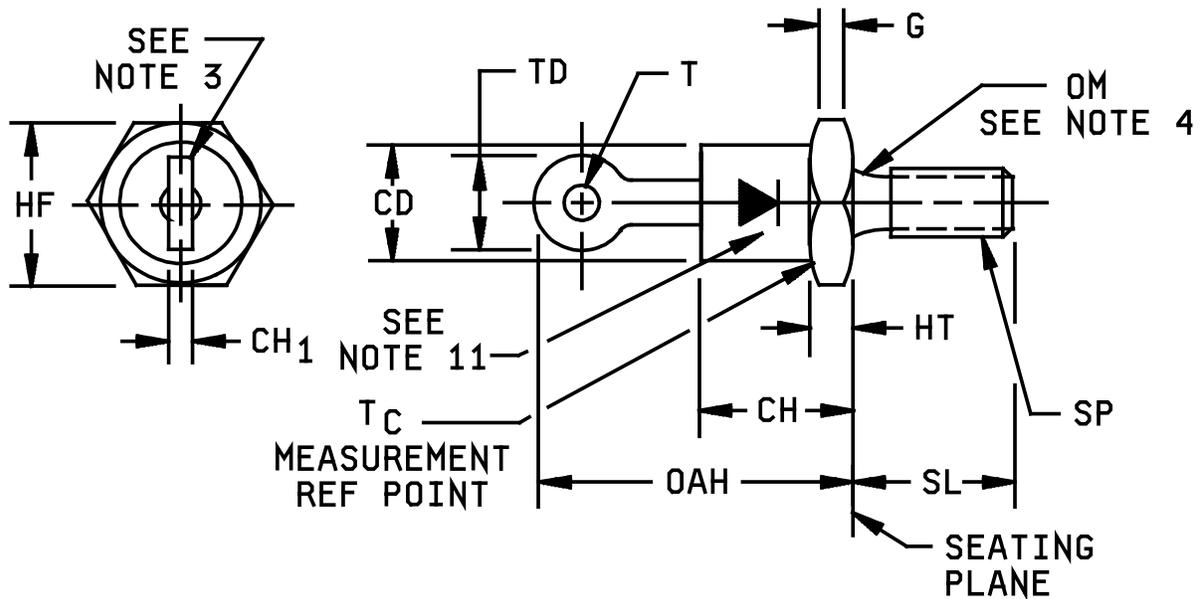


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
C	.020	.038	0.51	0.97	
CD		.487		12.37	3
CH		.550		13.97	
CH ₁		.050		1.27	
HF	.487	.500	12.37	12.70	
HT	.085	.160	2.16	4.06	
HT ₁	.040		1.02		
J	.750	.875	19.05	22.22	
K	.110	.140	2.79	3.56	3
OAH		.950		24.13	
OM	.163	.189	4.14	4.80	
SL	.422	.453	10.72	11.50	
SP					5, 6, 7, 8
T	.060		1.52		
T ₁	.110	.140	2.79	3.56	
T ₂	.055	.075	1.40	1.90	
TD		.250		6.35	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Angular orientation of this terminal is undefined. Square or radius on end of terminals is optional.
4. Diameter variations within these limits are permitted.
5. The ANSI thread reference is 0.190-32 UNF-2A.
6. Max pitch diameter of plated threads shall be basic pitch diameter .169 inch (4.29 mm) reference FED-STD-H28 (Screw Thread Standards for Federal Services.)
7. Units shall not be damaged by torque of 15 inch-pounds applied to 0.190-32 UNF-2B nut assembled on thread.
8. Complete threads to extend to within .078 inch (1.98 mm) of the seating plane.
9. Stud and seating plane shall be electrically insulated from the case, cathode, and anode.

FIGURE 1. Physical dimensions of isolated types: 1N3885, 1N3885A, 1N3886, 1N3886A, 1N3888, and 1N3888A.

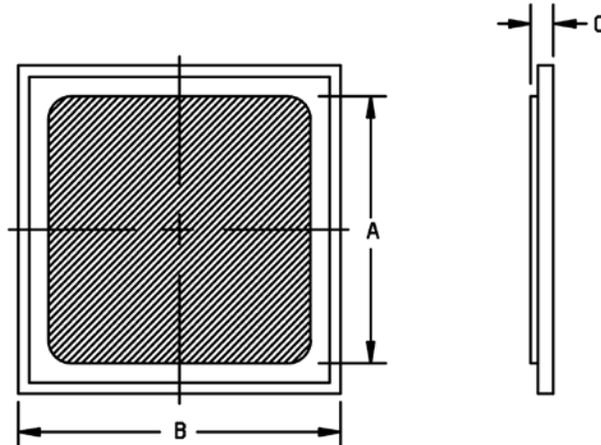


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.424		10.77	
CH		.405		10.29	
CH ₁	.020	.065	0.51	1.65	9
G	.060		1.52		
HF	.424	.437	10.77	11.10	
HT	.075	.175	1.90	4.44	
OAH		.800		20.32	
OM	.163	.189	4.14	4.80	
SL	.422	.453	10.72	11.50	
SP					5, 6, 7, 8
T	.060		1.52		
TD		.250		6.35	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Angular orientation of this terminal is undefined. Square or radius on end of terminals is optional.
4. Diameter variations within these limits are permitted.
5. The ANSI thread reference is 0.190-32 UNF-2A.
6. Max pitch diameter of plated threads shall be basic pitch diameter 0.169 inch (4.29 mm) reference FED-STD-H28 (Screw Thread Standards for Federal Services.)
7. Units must not be damaged by torque of 15 inch-pounds applied to 0.190-32 UNF-2B nut assembled on thread.
8. Complete threads to extend to within 0.078 inch (1.98 mm) of the seating plane.
9. Terminal-end shape is unrestricted.
10. Reversed (anode to stud) units shall be marked with an "R" following the last digit in the type number.
11. Forward polarity (cathode to stud) marking is shown.

FIGURE 2. Physical dimensions of non-isolated types: 1N3890, 1N3890A, 1N3891, 1N3891A, 1N3893, 1N3893A, 1N3890R, 1N3890AR, 1N3891R, 1N3891AR, 1N3893R, and 1N3893AR (DO-4).



A version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.114	.117	2.89	2.97
B	.130	.133	3.30	3.37
C	.009	.010	0.228	0.254

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The physical characteristics of the die are: Metallization {front (anode), {back, (cathode) consists of: Ag thickness = 3,000 Å minimum, Ni thickness = 1,500 Å minimum, Cr thickness = 800 Å minimum.
4. Requirements in accordance with MIL-PRF-19500 are performed in a DO-4 package.

FIGURE 3. Physical dimensions JANHC and JANKC.

3. REQUIREMENTS

* 3.1 General. The individual item requirements shall be as specified in MIL-PRF-190500 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. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and on figures 1, 2 (DO-4), and 3 (die).

3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500. Where a choice of lead finish is desired, it shall be specified in the contract or purchase order (see 6.2).

3.4.2 Diode types 1N3885, 1N3886, and 1N3888 (see figure 1). Diode types 1N3885, 1N3886, and 1N3888 have the stud and seating plane electrically insulated from the anode, cathode, and case.

3.4.3 Diode types 1N3890, 1N3891, and 1N3893 (see figure 2). Diode types 1N3890, 1N3891, and 1N3893 (forward polarity) have the cathode electrically connected to the stud and case.

3.4.4 Diode types 1N3890R, 1N3891R, and 1N3893R (see figure 2). Diode types 1N3890R, 1N3891R, and 1N3893R (reverse polarity) have the anode electrically connected to the stud and case.

3.4.5 Dissimilar construction. Types utilizing construction as shown on figure 1 shall not be considered structurally identical to types utilizing construction as shown in figure 2.

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

3.5.1 Polarity. The polarity shall be indicated by a graphic symbol with the arrow pointing toward the negative end for forward bias. The reversed units shall also be marked with an R following the last digit in the type number.

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.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups 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.

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).

4.1.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-PRF-19500 and herein, except lot accumulation period shall be 3 months in lieu of 6 weeks.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500, and as specified herein. Tests in either polarity shall be sufficient to obtain qualification approval of both polarities.

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* 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 Qualification for JANHC and JANKC. Qualification for JANHC and JANKC devices shall be in accordance with MIL-PRF-19500.

* 4.3 Screening. 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	
	JANS level	JANTX and JANTXV levels
<u>1/</u> 3b	Surge (see 4.3.1)	Surge (see 4.3.1)
3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
g	V_{F2} and I_{R1} <u>2/</u>	V_{F2} and I_{R1} <u>2/</u>
10	Method 1038, of MIL-STD-750, test condition A, t = 96 hours	Method 1038, of MIL-STD-750, test condition A, t = 48 hours
11	Subgroup 2 of table I herein, V_{F2} and I_{R1} ; $\Delta V_{F2} = 0.1$ V (pk) from initial value; $\Delta I_{R1} = \pm 5$ μ A dc or 100 percent from the initial value, whichever is greater.	Subgroup 2 of table I herein, V_{F2} and I_{R1} ; $\Delta V_{F2} = 0.1$ V(pk) from initial value; $\Delta I_{R1} = \pm 5$ μ A dc or 100 percent from the initial value, whichever is greater.
12	Burn-in see 4.3.3 and 4.5.2 , method 1038 of MIL-STD-750, test condition B	Not applicable
13	Subgroup 2 and 3 of table I herein, V_{F2} and I_{R1} ; $\Delta V_{F2} = 0.1$ V (pk); $\Delta I_{R1} = \pm 5$ μ A dc or 100 percent from the initial value, whichever is greater	Not applicable

1/ Surge shall precede thermal response. These tests shall be performed anytime after screen 3 and before screen 9.

2/ I_{R1} measurement shall not be indicative of an open condition.

4.3.1 Surge current. Surge current, see method 4066 of MIL-STD-750. $I_O = 0$; $V_{RM(w)} = 0$; six surges; $T_A = 25^\circ\text{C}$, $t_p = 8.3$ ms, one surge per minute maximum.

	Surge current value (I_{FSM})	
	A - version	Non A - version
1N3885	290	190
1N3886	290	190
1N3888	290	190
1N3890, R	310	210
1N3891, R	310	210
1N3893, R	310	210

* 4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3101 of MIL-STD-750 using the guidelines in that method for determining I_M , I_H , t_H , and K factor where appropriate). The limit will be statistically derived. See appendix E, table E-IX, subgroup 4, of MIL-PRF-19500 and [table II](#), subgroup 4 herein. $t_{MD} = 50$ to $300 \mu s$.

4.3.3 Burn-in and life test. Power burn-in conditions are as follows: Method 1038 of MIL-STD-750, , test condition B. $T_C = 100^\circ C$, rated I_O , see [4.5.2](#).

a. 1N3885, 1N3890, 1N3890R $V_R = 100$ V (pk)

b. 1N3886, 1N3891, 1N3891R $V_R = 200$ V (pk)

c. 1N3888, 1N3893, 1N3893R $V_R = 400$ V (pk)

4.3.4 Screening JANHC and JANKC. Screening for JANHC and JANKC shall be in accordance with MIL-PRF-19500 and 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 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 appendix E, table E-VIa (JANS) and table E-VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and [4.4.2.1](#) and [4.4.2.2](#) herein. Electrical measurements (end-points) shall be in accordance with [table I](#), subgroup 2 herein. Delta measurements shall be in accordance with [table III](#) herein.

* 4.4.2.1 Group B inspection, table E-VIa (JANS) of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	4066	$T_C = 100^\circ C$; $V_R =$ rated V_R (see 1.3), six surges. one surge per minute maximum. $t_p = 8.3$ ms. Non-A version devices, $I_{FS} = 150$ A; $I_O = 12$ A dc A version devices, $I_{FS} = 225$ A; $I_O = 20$ A dc.
B4	1037	0.25 rated $I_O \leq I_O$ applied \leq rated I_O (see 4.5.4) 2,000 cycles.
* B5	1027	$I_F = 35$ A dc at: $T_A = 125^\circ C$ for 96 hours, or adjusted as required by the chosen T_A to give an average lot $T_J = 275^\circ C$; $f = 60$ Hz; $V_R =$ rated V_R (pk) (see 1.3). For irradiated devices, include t_{tr} as an end-point measurement.
B6	3101	$R_{\theta JC} =$ rated $R_{\theta JC}$ (see 1.4); $I_M = 50$ mA $\leq I_M \leq 250$ mA; $t_H = 30$ s minimum; $t_{MD} = 50 - 300 \mu s$.
* B8	4065	Peak reverse power $P_{RM} \geq 636$ W for square wave in accordance with test method 4065 of MIL-STD-750 ($P_{RM} \geq 1,000$ W for half-sine wave). Test shall be performed on each subplot; sampling plan. $n = 10$, $c = 0$, electrical end-points, see table I , subgroup 2 herein.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B2	1051	Insulated types -55°C to + 175°C; uninsulated types -55°C to + 175°C.
B2	4066	$T_C = 100^\circ\text{C}$; $V_R = \text{rated } V_R$ (see 1.3), six surges. one surge per minute maximum. $t_p = 8.3$ ms. Non-A version devices, $I_{FS} = 150$ A; $I_O = 12$ A dc A version devices, $I_{FS} = 225$ A; $I_O = 20$ A dc.
* B3	1037	0.25 rated $I_O \leq I_O$ applied \leq rated I_O (see 4.5.4) 2,000 cycles. For irradiated devices, include t_{rr} as an end-point measurement.
* B3	1038 or 1049	Condition A; 340 hrs (separate samples may be used). For irradiated devices, include t_{rr} as an end-point measurement.
B5		Not applicable.
B6	1032	$T_A = 150^\circ\text{C}$.

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

4.4.3.1 Group C inspection, table E-VII of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	1056	Test condition B.
C2	2036	Tension, test condition A, $t = 15$ s. For 1N3885, A, 1N3886, A, 1N3888, A weight = 5 pounds. For 1N3890, A, R, AR, 1N3891, A, R, AR, 1N3893, A, R, AR, weight = 20 pounds.
C2	2036	Bending stress, test condition F, method B: $t = 15$ s. For 1N3885, A, 1N3886, A, 1N3888, A weight = 1 pounds. For 1N3890, A, R, AR, 1N3891, A, R, AR, 1N3893, A, R, AR, weight = 5 pounds.
C2	2036	Seal torque test condition D1, torque = 10 oz-inches, $t = 15$ s.
C5	3101	$R_{\theta JC} = \text{rated } R_{\theta JC}$ (see 1.4); $I_M = 50$ mA $\leq I_M \leq 250$ mA; $t_H = 30$ s minimum; $t_{MD} = 50$ to 300 μs .
* C6	1037	0.25 rated $I_O \leq I_O$ applied \leq rated I_O (see 4.5.4) 6,000 cycles. For irradiated devices, include t_{rr} as an end-point measurement.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, 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. Delta electrical measurements shall be in accordance with [table III](#) 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 measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Burn-in and steady-state operation life tests. These tests shall be conducted with a half-sine waveform of the specified peak voltage impressed across the diode in the reverse direction followed by a half-sine waveform of the specified average rectifier current. The forward conduction angle of the rectified current shall not be greater than 180°C nor less than 150°C.

4.5.3 Insulation resistance (case-to-stud). The case-to-stud insulation resistance shall be determined in terms of current flow between the case and stud. The specified test method shall be utilized except that the applied voltage shall be within ± 2.0 percent of the specified value and the current shall be measured by a series microammeter with a voltage drop at 1.0 μA dc of less than 1.0 V dc, and an accuracy of ± 2.0 percent at the 1.0 μA dc point.

4.5.4 DC intermittent operation life. A cycle shall consist of an "on" period, when power is applied suddenly, not gradually, to the device for the time necessary to achieve a delta case temperature of 85°C, +15°C, -5°C, followed by an "off" period, when the power is suddenly removed, for cooling. Auxiliary (forced) cooling is permitted during the off period only.

$t_{\text{heating}} \leq 5$ minutes. $P = V_F \times I_F$ or $P = V_{F(\text{pk})} \times I_{\text{av}}$ if using sine wave current. DC full wave current shall be used for the power required during the "on" period (or equivalent half sine wave current).

Within the time interval of 50 cycles before to 500 cycles after the termination of the test, the sample units shall be removed from the specified test conditions and allowed to reach room ambient test conditions. Specified end-point measurements for qualification and conformance inspection shall be completed within 96 hours after removal of sample units from the specified test conditions. Additional readings may be taken at the discretion of the manufacturer.

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* TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical Inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance	3101	See 4.3.2	$Z_{\theta JX}$			°C/W
Forward voltage	4011	$t_p < 8.3$ ms, duty cycle ≤ 2 percent pulse $I_F = 38$ A(pk)	V_{F2}		1.5	V dc
Reverse current	4016	DC method $V_R =$ rated V_R (see 1.3)	I_{R1}		10	μ A dc
Insulation resistance (case to stud) applicable only to 1N3885, 1N3885A 1N3886, 1N3886A 1N3888, 1N3888A	1016	Test condition C, see 4.5.3	R_{ISO}	10^9		Ohms
<u>Subgroup 3</u>						
High temperature operation:		$T_A = T_C = 150^\circ\text{C}$				
Reverse current	4016	DC method $V_R =$ rated $V_{R(pk)}$ (see 1.3)	I_{R2}		2	mA dc
<u>Subgroups 4 and 5</u>						
Not applicable						
<u>Subgroup 6</u> <u>2/</u>						
Forward voltage	4011	$I_F = I_{FS}$; $t_p = 800$ μ s	V_{F1}		2.75	V dc
Forward voltage	4011	$I_F = I_{FS}$; $t_p = 8.3$ ms	V_{F1}		2.55	V dc
<u>Subgroup 7</u>						
Reverse recovery time	4031	$T_C = 55^\circ\text{C}$; $I_F = 1$ A dc; $V_R = 30$ V dc, $di/dt = -25$ A/ μ s; $I_{r(rec)} \leq 2$ A (pk)	t_{rr}			ns
Non A A-versions					200 150	

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

2/ V_{F1} shall be performed with either $t_p = 800$ μ s or $t_p = 8.3$ ms.

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* TABLE II. Group E inspection (all quality levels) for qualification and requalification only.

Inspection 1/	MIL-STD-750		Sampling plan
	Method	Conditions	
<u>Subgroup 1</u>			45 devices, c = 0
Thermal shock	1056	0°C to 100°C, 100 cycles.	
Hermetic seal	1071		
Electrical measurements		See table I subgroup 2 and table III herein.	
<u>Subgroup 2</u>			45 devices, c = 0
Steady-state dc blocking life	1038	Condition A; 1,000 hrs.	
Electrical measurements		See table I subgroup 2 and table III herein. (Except Z _{θJX} need not be performed.)	
<u>Subgroup 4</u>			
Thermal impedance curves		See MIL-PRF-19500.	
<u>Subgroup 5</u>			22 devices, c = 0
Barometric pressure, reduced (altitude operation)	1001	Hg = rated Hg (see 1.3), t = 60 s, while the test is being performed, I _R shall be monitored and shall not exceed 25 μA dc. T _C = 25°C.	
<u>Subgroup 6 2/</u>			11 devices, c = 0
ESD	1020		
<u>Subgroup 8</u>			45 devices
Peak reverse power	4065	Peak reverse power (P _{RM})= shall be characterized by the supplier and this data shall be available to the Government. Test shall be performed on each subplot.	
Electrical measurement		During the P _{RM} test, the voltage (V _{BR}) shall be monitored to verify it has not collapsed. Any collapse in V _{BR} during or after the P _{RM} test, or rise in leakage current (I _R) after the test that exceeds I _{R1} in table I , shall be considered a failure to that level of applied P _{RM} . Progressively higher levels of P _{RM} shall be applied until failure occurs on all devices within the chosen sample size to characterize each subplot.	
<u>Subgroup 10</u>			22 devices, c = 0
Forward surge	4066	Condition A, ten surges of 8.3 ms each at 1 minute intervals, V _{RWM} = rated V _{RWM} (see 1.3). T _C = +100°C. Non-A version devices, I _{FS} = 150 A; I _O = 12 A dc; A version devices, I _{FS} = 225 A; I _O = 20 A dc.	

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TABLE III. Groups B and C delta electrical measurements. 1/ 2/ 3/ 4/ 5/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1	Thermal response	3101	See 4.3.2, $R_{\theta JC}$ = rated $R_{\theta JC}$ (see 1.4)	ΔV_F			mV dc
2.	Forward voltage	4011	$I_F = 50$ mA dc	ΔV_{F3}	+50 mV dc maximum change from previous to post intermittent life and thermal shock measurement tests (JANS only).		
3.	Reverse current	4016	DC method $V_R =$ rated V_R (dc) (see 1.3)	ΔI_{R1}	100 percent or ± 5 μ A, (whichever is greater) change from initial group A reading.		

- 1/ Devices which exceed the group A limits for this test shall be rejected.
- 2/ The delta measurements for table E-VIa (JANS) of MIL-PRF-19500 are as follows:
- Subgroup 3, see [table III](#) herein, steps 1 and 2.
 - Subgroup 4, see [table III](#) herein, steps 1 and 2.
 - Subgroup 5, see [table III](#) herein, step 3.
- 3/ The delta measurements for table E-VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are as follows:
- Subgroup 3, see [table III](#) herein, step 1.
- 4/ The delta 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, steps 1 and 3 (JANS); and step 1 (JAN, JANTX, and JANTXV).
- 5/ The delta 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 3.

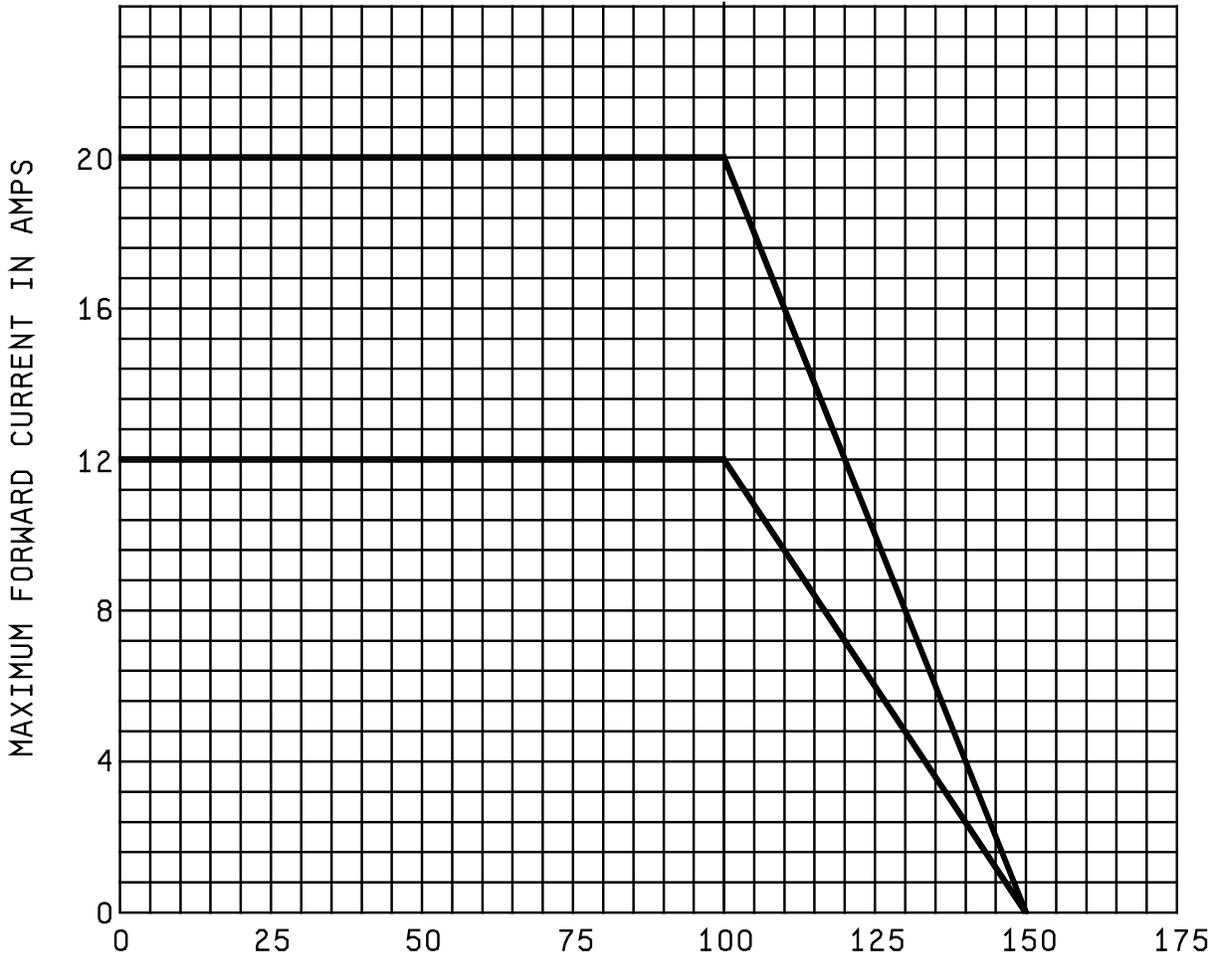


FIGURE 4. Maximum case temperature in °C.

Maximum Thermal Impedance

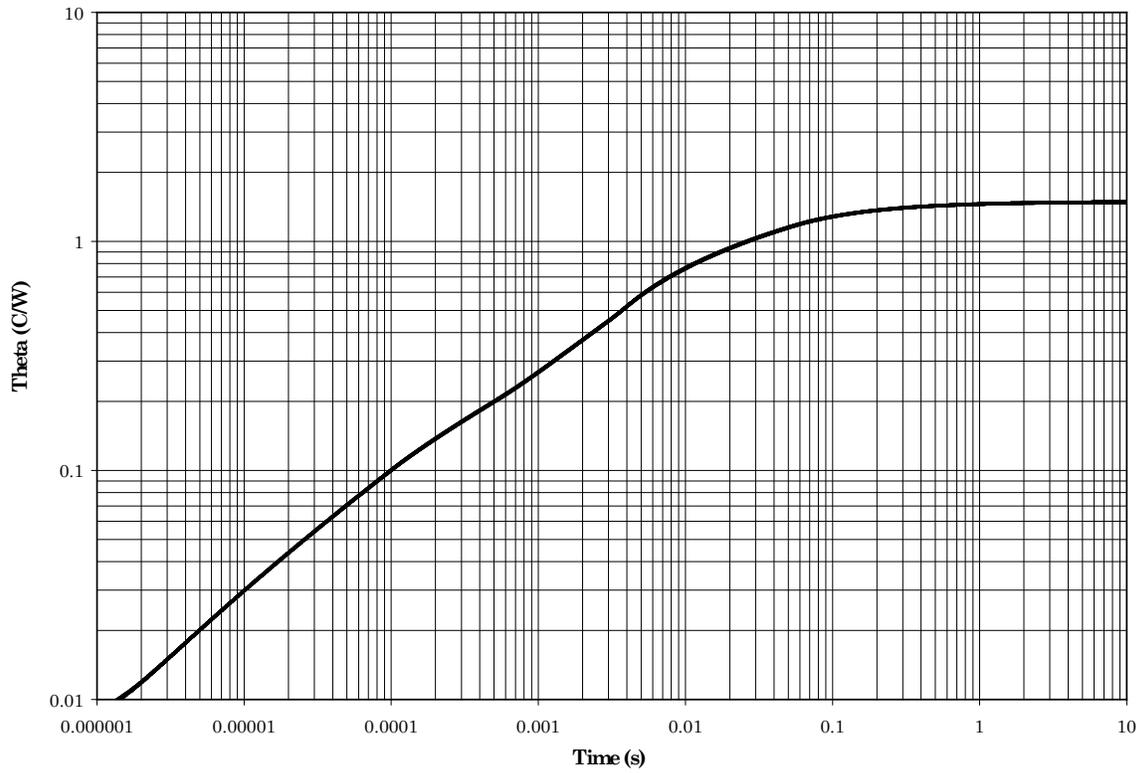


FIGURE 5. Thermal impedance graph $R_{\theta JC}$ for Non isolated A type devices.

5. PACKAGING

* 5.1 Packaging. For acquisition purposes, the packaging requirements should be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' 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. For die acquisition, the letter version shall be specified (see figure 3).

* 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 Manufacturer's 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: VQE, Columbus, OH 43216 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.daps.dla.mil>.

6.4 Supersession data. The following types were superseded through a previous revision of this specification and the cancellation of MIL-S-19500/266. A-version devices may be substituted for Non A-version devices. Applicable substitutes are as follows:

Superseded types	Substitute types
1N3874, 1N3875, 1N3884	1N3885
1N3876	1N3886
1N3877, 1N3878, 1N3887	1N3888
1N3879, 1N3880, 1N3889	1N3890
1N3879R, 1N3880R, 1N3889R	1N3890R
1N3881	1N3891
1N3881R	1N3891R
1N3882, 1N3883, 1N3892	1N3893
1N3882R, 1N3883R, 1N3892R	1N3893R

NOTE: Superseded types shall not be used for new design.

6.5 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example JANHCA1N3885) will be identified on the QML.

JANHC and JANKC ordering information	
PIN (1) (2)	Manufacturer
	43611
1N3885	JANHCA1N3885
1N3886	JANHCA1N3886
1N3888	JANHCA1N3888
1N3890	JANHCA1N3890
1N3891	JANHCA1N3891
1N3893	JANHCA1N3893

(1) Also applies to "A" suffix devices.

(2) For JANS level, replace "JANHC" prefix with "JANKC".

* 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 5961-2009-078)

Review activities:
 Army - AR, MI, SM
 Navy - AS, MC
 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.daps.dla.mil>.