

The documentation and process conversion measures necessary to comply with this revision shall be completed by 18 January 2002.

INCH-POUND

MIL-PRF-19500/429G
 18 October 2001
 SUPERSEDING
 MIL-PRF-19500/429F
 21 April 1999

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER, FAST RECOVERY
 TYPES 1N5615, 1N5617, 1N5619, 1N5621, 1N5623, 1N5615UL, 1N5617UL, 1N5619UL,
 1N5621UL, 1N5623UL, 1N5615US, 1N5617US, 1N5619US, 1N5621US, 1N5623US,
 JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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

1. SCOPE

1.1 Scope. This specification covers the performance requirements for silicon, fast recovery power rectifier diodes. Four levels of product assurance are provided for each encapsulated device as specified in MIL-PRF-19500. Two levels of product assurance are provided each unencapsulated device type.

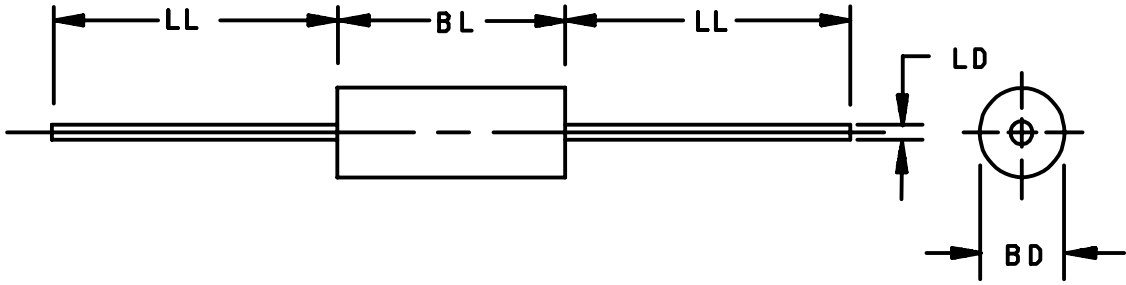
1.2 Physical dimensions. See figure 1 (similar to D0-7), figures 2 and 3 surface mount (D-5A), and figures 4, and 5 (JANHC and JANKC).

1.3 Maximum ratings.

Types (1)	V _R	V _{RWM}	I _O		t _{rr}	T _{STG} and T _J	I _{FSM}	R _{θJL} R _{θJEC}	
			T _A = +55°C (2) (3)	T _A = +100°C (3) (4)					
	V _{dc}	V(pk)	A dc	mA dc	ns	°C	T _A = +100°C I _O = 750 mA dc t _p = 8.3 ms A(pk)	Barometric pressure (reduced) mmHg	(5)
1N5615	200	200	1	750	150	-65 to +175	25	N/A	
1N5617	400	400	1	750	150	-65 to +175	25	8	
1N5619	600	600	1	750	250	-65 to +175	25	8	
1N5621	800	800	1	750	300	-65 to +175	25	33	
1N5623	1,000	1,000	1	750	500	-65 to +175	25	33	

- (1) Electrical characteristics for UL and US suffix are identical to the corresponding non-suffix device.
- (2) From 1 A dc at T_A = +55°C, to .75 A dc at T_A = +100°C, derate linearly at 5.56 mA/°C.
- (3) For the 1 A dc rating at +55°C and the 750 mA dc rating at +100°C, no special mounting, heat sinking, or forced-air flow across exposed areas of the device is required.
- (4) From .75 A dc at T_A = +100°C, to 0 A dc at T_A = +175°C, derate linearly at 10 mA/°C.
- (5) R_{θJL} ≤ 38°C/W at L = .375 inch (9.53 mm); for UL and US suffix type devices. R_{θJEC} = 7.0°C/W.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

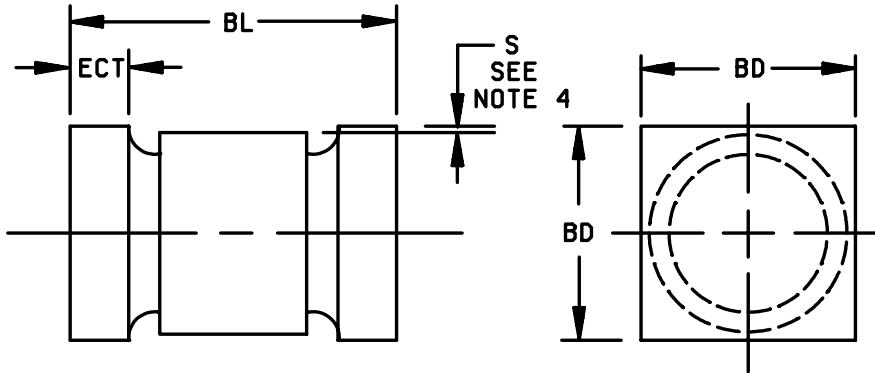


Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.065	.110	1.65	2.79	3
LD	.026	.033	.66	.84	
BL	.130	.225	3.30	5.71	4
LL	1.00	1.30	25.40	33.02	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. Dimension BL shall include all uncontrolled areas of the device.

FIGURE 1. Physical dimensions (for non-UL and non-US suffix devices only) (similar to D0-7).

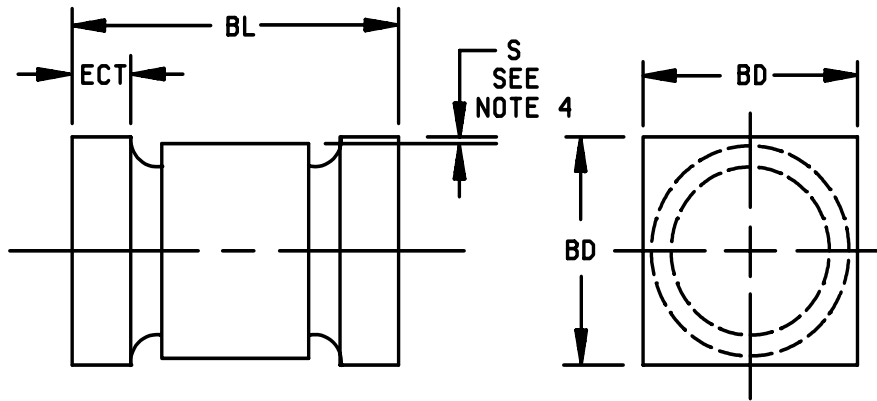


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.168	.225	4.27	5.72
ECT	.019	.028	0.48	0.71
S	.003		0.08	
BD	.091	.125	2.31	3.18

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions are pre-solder dip.
4. Minimum clearance of glass body to mounting surface on all orientations.

FIGURE 2. Physical dimensions for types 1N5615UL, 1N5617UL, 1N5619UL, 1N5621UL, and 1N5623UL, (surface mount devices) (D-5A).

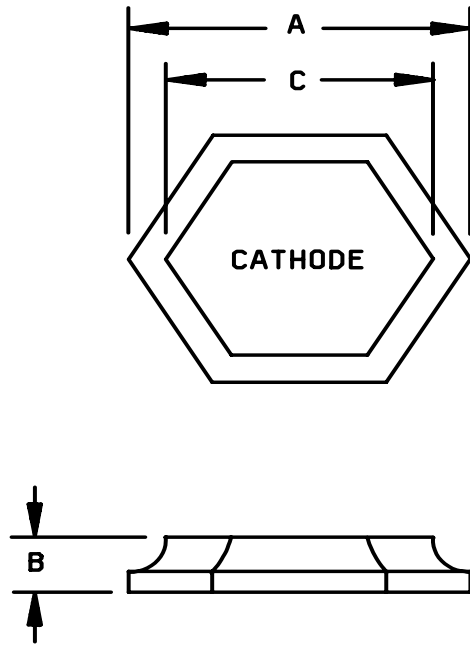


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.168	.200	4.27	5.08
ECT	.019	.028	0.48	0.71
S	.003		0.08	
BD	.091	.103	2.31	2.62

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions are pre-solder dip.
4. Minimum clearance of glass body to mounting surface on all orientations.

FIGURE 3. Physical dimensions for types 1N5615US, 1N5617US, 1N5619US, 1N5621US, and 1N5623US, (surface mount devices) (D-5A).



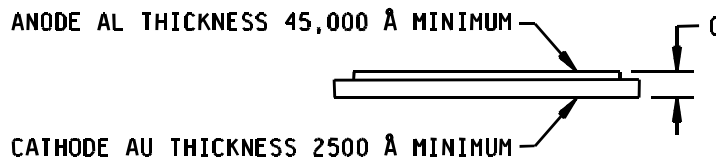
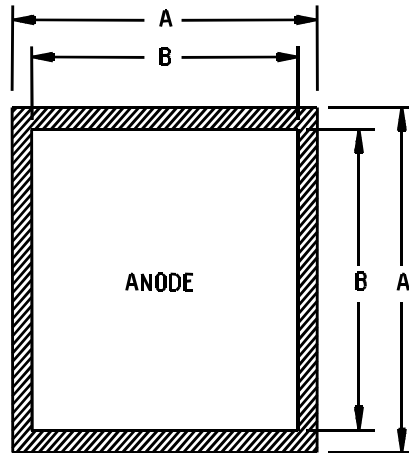
A - version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.047	.053	1.19	1.35
B	.007	.011	0.18	0.28
C	.033	.037	0.84	0.94

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die are:
 Top metal: Gold 10,000 Å minimum.
 Back metal: Gold 4,000 Å minimum.

FIGURE 4. Physical dimensions, JANHCA and JANKCA die.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.039	.043	1.00	1.09
B	.021	.025	0.53	0.64
C	.008	.012	0.20	0.31

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die are:
 Top metal: Aluminum (anode) 45,000 Å minimum.
 Back metal: Gold (cathode) 2,500 Å minimum.

FIGURE 5. Physical dimensions, JANHCB and JANKCB die.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 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 sections 3 and 4 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARD

DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Services (DAPS), Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

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 and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500 and on figure 1 (similar to DO-7), figures 2 and 3 surface mount (D-5A), and figures 4 and 5 (JANHC and JANKC).

3.4.1 Lead finish. Unless otherwise specified, lead finish shall be solderable in accordance with 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 Encapsulant material. In addition to those categories of hermetically sealed package requirements specified in MIL-PRF-19500, fused-metal-oxide to metal shall also be acceptable.

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

3.5.1 Marking of UL and US version. For UL and US version only, all marking (see 3.5) may be omitted from the body, but shall be retained on the initial container.

3.6 Polarity. The polarity of all types shall be indicated with a contrasting color band to denote the cathode end. Alternatively, for UL and US suffix devices, a minimum of three contrasting color dots spaced around the periphery on the cathode end or a contrasting color band may be used.

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

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

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

4. VERIFICATION

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

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

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

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with MIL-PRF-19500 and table II herein for qualification or requalification only. In case qualification was awarded to a prior revision of the associated specification that did not request the performance of table II tests, the tests specified in table II herein must be performed to maintain qualification. Electrical measurements (end-points) shall be in accordance with the applicable steps of table I, subgroup 2 herein and for delta measurements see table III herein.

4.2.2 JANHC and JANKC devices. Qualification for die shall be in accordance with MIL-PRF-19500 and as specified herein.

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

Screen (see table IV of MIL-PRF-19500)	Measurement	
	JANS Level	JANTXV and JANTX Level
1a	Required	Not required
1b	Required	Required (JANTXV only)
2	Not required	Not required
3a (1) 3c	Required Thermal impedance (see 4.3.3)	Required Thermal impedance (see 4.3.3)
4	Not applicable	Not applicable
5	Not applicable	Not applicable
6	Not applicable	Not applicable
7a	Not applicable	Not applicable
7b	Required	Required
8	Required	Not required
9	Required	Not required
10	Method 1038, of MIL-STD-750, condition A	Method 1038, of MIL-STD-750, condition A
11	I_{R1} and V_F , $\Delta I_{R1} \leq 100$ percent of initial reading or ± 100 nA dc, whichever is greater. $\Delta V_F \leq \pm 0.1$ V dc	I_{R1} and V_F
12	Required See 4.3.1	Required See 4.3.1
(2) 13	Subgroups 2 and 3 of table I herein: $\Delta I_{R1} \leq 100$ percent of initial reading or ± 100 nA dc, whichever is greater. $\Delta V_F \leq \pm 0.1$ V dc. Scope display evaluation (see 4.5.4).	Subgroup 2 of table I herein: $\Delta I_{R1} \leq 100$ percent of initial reading or ± 100 nA dc, whichever is greater. $\Delta V_F \leq \pm 0.1$ V dc. Scope display evaluation (see 4.5.4).
14a	Not applicable	Not applicable
14b	Optional	Optional
15	Required	Not required
16	Required	Not required
17	Not required	Not 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) $Z_{\theta JX}$ is not required in screen 13, if already previously performed.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows: Method 1038 of MIL-STD-750, condition B, $V_R =$ full rated V_{RWM} (see 1.3); $f = 50$ -60 Hz; $I_O = I_O$ rated (1 A dc) min, (see 4.5.6), $T_A = 50^\circ\text{C}$ max.

4.3.2 Screening (JANHNC and JANKC). Screening of die shall be in accordance with appendix H of MIL-PRF-19500. As a minimum, die shall be 100-percent probed to ensure compliance with group A, subgroup 2. Burn-in duration for the JANKC level follows JANS requirements; the JANHNC follows JANTX requirements.

4.3.3 Thermal impedance. Thermal impedance $Z_{\theta JX}$ measurements shall be performed in accordance with method 3101 of MIL-STD-750. The maximum limit for $Z_{\theta JX}$ in screening (table IV of MIL-PRF-19500) shall be derived by each vendor by means of statistical process control and applied in screening of all subsequent lots. This limit shall not exceed the group A, subgroup 2 limit. The following conditions shall apply:

- a. $I_H = 5$ A minimum.
- b. $t_H = 10$ ms.
- c. $I_M = 1$ mA to 10 mA.
- d. $t_{MD} = 100$ μ s maximum.

4.3.3.1 Thermal impedance ($Z_{\theta JX}$ measurements) for initial qualification or requalification. The $Z_{\theta JX}$ measurements shall be performed in accordance with method 3101 of MIL-STD-750 (read and record value $Z_{\theta JX}$) and shall be supplied to the qualifying activity on a 500 piece sample from the qualification lot prior to qualification approval.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein. If alternate screening is being performed in accordance with E.5.3.1d of MIL-PRF-19500, a sample of screened devices shall be submitted to and pass the requirements of group A1 and A2 inspection only (table VIb, group B, subgroup 1 is not required to be performed again if group B has already been satisfied in accordance with 4.4.2).

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein. The following test conditions shall be used for $Z_{\theta JX}$ in group A, subgroup 2 inspection:

- a. I_M measuring current - - - - - 10 mA.
- b. I_H forward heating current - - - - - 10 A.
- c. t_H heating time - - - - - 10 ms.
- d. t_{MD} measurement delay time - - - - - 100 μ s maximum.

The maximum limit for $Z_{\theta JX}$ in group A, subgroup 2 is $Z_{\theta JX}$ (maximum) = 4.5°C/W.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein; except, $Z_{\theta JX}$ need not to be performed. See table III for delta limits when applicable.

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4.4.2.1 Group B inspection, table VIa (JANS) of MIL-PRF-19500. For B5 if a failure occurs resubmission shall be at the test conditions of the original sample.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B4	1037	$I_O = I_O$ rated minimum. $V_R =$ maximum rated V_{RWM} (see 1.3 and 4.5.3); 2,000 cycles.
B5	1027	$I_O = I_O$ rated minimum; $T_A = +100^\circ\text{C}$ max. apply $V_R =$ rated V_{RWM} (see 1.3 and 4.5.3); adjust T_A and I_O to achieve $T_J = +275^\circ\text{C}$ minimum; $f = 50\text{-}60$ Hz. or $I_O = I_O$ rated minimum; $T_A = +50^\circ\text{C}$ max. apply $V_R =$ rated V_{RWM} (see 1.3 and 4.5.3); adjust T_A and I_O to achieve $T_J = +200^\circ\text{C}$ minimum for 1,000 hours at double the sample size.; $f = 50\text{-}60$ Hz.
B6	3101 or 4081	$+25^\circ\text{C} \leq T_A \leq +35^\circ\text{C}$ (recorded before test is performed); $R_{\theta JL}$ (maximum) $\leq 38^\circ\text{C/W}$; $L = .375$ inch (9.53 mm) (see figure 6). For surface mount devices (UL and US versions), $R_{\theta JEC} \leq 7^\circ\text{C/W}$.
B7		Peak reverse power, see 4.5.5 and figure 7 herein. $P_{RM} \geq 500$ W. Test shall be performed on each subplot; sampling plan $n = 22$, $c = 0$, end points, see 4.4.2.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	1027	$I_O = I_O$ rated (1 A dc) minimum; $T_A = +50^\circ\text{C}$ max. adjust T_A and I_O to achieve the required T_J apply $V_R =$ rated V_{RWM} (see 1.3), $f = 50\text{-}60$ Hz (see 4.5.6).

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein; except, $Z_{\theta JX}$ need not be performed. See table III for delta limits when applicable.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Tension: Test condition A; weight = 12 pounds; $t = 30$ seconds. Lead fatigue: Test condition E; weight 1 pounds. NOTE: Both tension and lead fatigue are not applicable for US devices.
C6	1027	$I_O = I_O$ rated (1 A dc) minimum; $T_A = +50^\circ\text{C}$ max. adjust T_A and I_O to achieve the required T_J apply $V_R =$ rated V_{RWM} (see 1.3), $f = 50\text{-}60$ Hz (see 4.5.6).

4.5 Methods of inspection. Methods of inspection shall be 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 Inspection conditions. Unless otherwise specified, all inspections shall be conducted at an ambient temperature T_A of $+25^\circ\text{C} \pm 3^\circ\text{C}$.

4.5.3 Burn-in and 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 rectified current. The forward conduction angle of the rectified current shall be neither greater than 180 degrees, nor less than 150 degrees.

4.5.4 Scope display evaluation. Scope display evaluation shall be stable in accordance with method 4023 of MIL-STD-750. Scope display may be performed on ATE (automatic test equipment) for screening only with the approval of the qualifying activity. Scope display in group A shall be performed on a scope.

4.5.5 Peak reverse power test. This test shall be measured in the circuit of figure 7, or equivalent. A 20 microsecond half-sine waveform of current shall be used and peak reverse power shall be determined by the product of peak reverse voltage and peak reverse current.

4.5.6 Mounting conditions. Any clips or heat sink mounting configurations may be utilized provided that I_O is adjusted such that the junction temperature of each diode is maintained at $T_J = 135^\circ\text{C}$ minimum for burn-in and $T_J = 150^\circ\text{C}$ minimum for life testing.

4.5.7 Thermal resistance. Thermal resistance measurements shall be conducted in accordance with test method 3101 or 4081 of MIL-STD-750. Read and record data in accordance with group E herein and shall be included in the qualification report. Forced moving air or draft shall not be permitted across the devices during test. The maximum limit for $R_{\theta_{JL}}$ under these test condition shall be $R_{\theta_{JL}} \leq 4.5^\circ\text{C/W}$ for $L = .375$;

- a. I_H 5 A minimum.
- b. t_H 10 ms.
- c. I_M 1.0 mA to 10 mA.
- d. t_{MD} 100 μs maximum.

The device shall be allowed to reach equilibrium at current I_H before the measurement shall be made ($t_H \geq 25$ sec).

LS = Lead spacing = .375 inch (9.53) mm minimum for leaded devices and LS = 0 minimum for unlead devices as defined (see figure 8) (Metric equivalents are given for general information only):

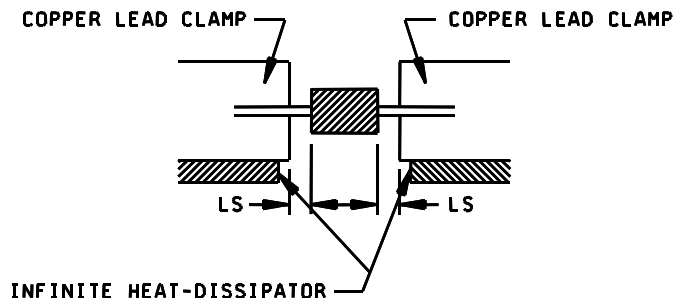


FIGURE 8. Mounting arrangement.

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> Forward voltage	4011	$I_F = 3 \text{ A dc (pulsed)}$; (see 4.5.1) $t_p = 300 \mu\text{s}$; 2 percent maximum duty cycle	V_F	0.8	1.6	V_{pk}
Reverse current leakage 1N5615, 1N5615UL,US 1N5617, 1N5617UL,US 1N5619, 1N5619UL,US 1N5621, 1N5621UL,US 1N5623, 1N5623UL,US	4016	DC method $V_R = 200 \text{ V dc}$ $V_R = 400 \text{ V dc}$ $V_R = 600 \text{ V dc}$ $V_R = 800 \text{ V dc}$ $V_R = 1,000 \text{ V dc}$	I_{R1}		0.5 0.5 0.5 0.5 0.5	$\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$
Breakdown voltage 1N5615, 1N5615UL,US 1N5617, 1N5617UL,US 1N5619, 1N5619UL,US 1N5621, 1N5621UL,US 1N5623, 1N5623UL,US	4021	$I_R = 50 \mu\text{A dc}$	$V_{(BR)R}$	220 440 660 880 1100		V dc V dc V dc V dc V dc
Thermal impedance <u>Subgroup 3</u>	3101	See 4.4.1	$Z_{\theta JX}$		4.5	$^{\circ}\text{C/W}$
High temperature operation:		$T_A = +100^{\circ}\text{C}$				
Reverse current leakage 1N5615, 1N5615UL,US 1N5617, 1N5617UL,US 1N5619, 1N5619UL,US 1N5621, 1N5621UL,US 1N5623, 1N5623UL,US	4016	DC method $V_R = 200 \text{ V dc}$ $V_R = 400 \text{ V dc}$ $V_R = 600 \text{ V dc}$ $V_R = 800 \text{ V dc}$ $V_R = 1,000 \text{ V dc}$	I_{R2}		25 25 25 25 25	$\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$ $\mu\text{A dc}$

See footnote at end of table.

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TABLE I. Group A inspection - continued.

Inspection ^{1/}	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u>						
Reverse recovery time 1N5615, 1N5615UL,US 1N5617, 1N5617UL,US 1N5619, 1N5619UL,US 1N5621, 1N5621UL,US 1N5623, 1N5623UL,US	4031	Condition B1	t_{rr}		150 150 250 300 500	ns ns ns ns ns
Capacitance 1N5615, 1N5615UL,US 1N5617, 1N5617UL,US 1N5619, 1N5619UL,US 1N5621, 1N5621UL,US 1N5623, 1N5623UL,US	4001	$V_R = 12$ V dc, $0.1 < f < 1.0$ MHz	C		45 35 25 20 15	pF pF pF pF pF
Scope display	4023	See 4.5.4 $n = 116, c = 0$				
<u>Subgroup 5</u>						
Not applicable						
<u>Subgroup 6</u>						
Surge	4066	$I_{FSM} = 25$ A (pk); 10 surges of 8.3 ms each at 1 minute intervals, $I_O = 750$ mA dc; $V_R =$ rated V_{RWM} (see 1.3); $T_A = +100^\circ\text{C}$; ($T_{EC} = +100^\circ\text{C}$ for surface mount devices (UL and US version)).				
<u>Subgroup 7</u>						
Not applicable						

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

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

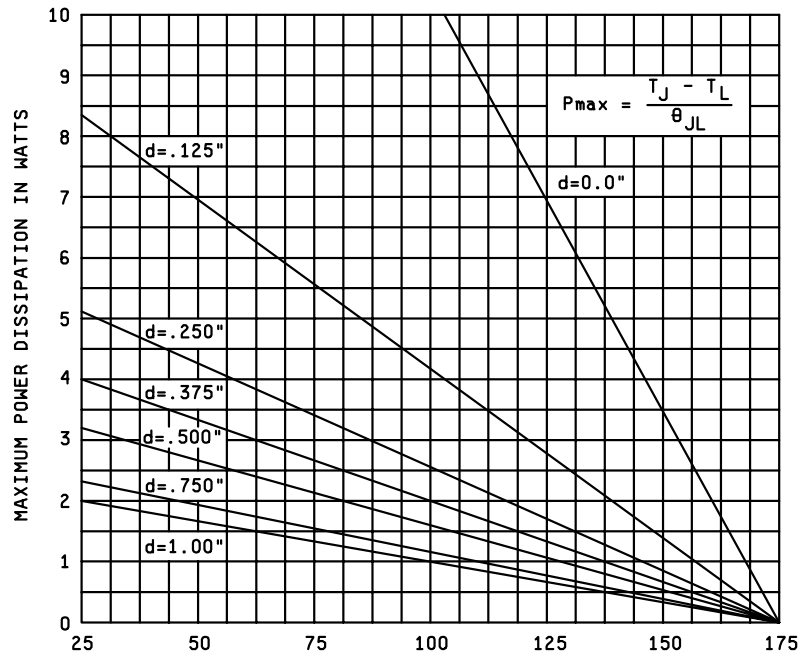
Inspection	MIL-STD-750		Sampling plan
	Method	Conditions	
<u>Subgroup 1</u> Temperature cycling	1051	500 cycles, condition C	22 devices c = 0
Electrical measurements <u>1/</u>		See table I, group A, subgroup 2	
<u>Subgroup 2</u> Steady-state dc blocking life	1038	1,000 hours, condition A $V_R = V_{RWM}$	22 devices c = 0
Electrical measurements <u>1/</u>		See table I, group A, subgroup 2	
<u>Subgroup 3</u> Not applicable			
<u>Subgroup 4</u> Thermal resistance	3101 or 4081	See 4.5.7; $R_{\theta JL} \leq 38^\circ\text{C/W}$ at $L = .375$ inch (9.53 mm); for UL and US suffix type devices. $R_{\theta JEC} = 7.0^\circ\text{C/W}$.	22 devices c = 0
<u>Subgroup 5</u> Barometric pressure, reduced (altitude operation)		1001	
<u>Subgroup 6</u> Not applicable			
<u>Subgroup 7</u> Peak reverse power		See 4.5.5 herein Peak reverse power, see 4.5.5 and figure 7 herein. $P_{RM} \geq 500$ W. Test shall be performed on each subplot; sampling plan: $n = 10$, $c = 0$, end-points, see 4.4.2..	22 devices c = 0

1/ $Z_{\theta JX}$ not applicable.

TABLE III. Groups A, B, and C electrical measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Reverse current leaking change	4016	DC method	ΔI_{R1} 4/		For JAN, JANTX, and JANTXV, ≤ 250 nA dc or 100 percent, whichever is greater; for JANS, ≤ 100 nA dc or 100 percent, whichever is greater.	
2.	Forward voltage change	4011	$I_F = 3$ A dc; Pulsed (see 4.5.1) $t_p = 300$ μ s; 2 percent maximum duty cycle.	ΔV_{F1} 4/		± 50 mV dc maximum change from previous measured value.	

- 1/ The electrical measurements for table VIa (JANS) of MIL-PRF-19500 are as follows:
- Subgroup 3, see table III herein, step 2.
 - Subgroup 4, see table III herein, step 2.
 - Subgroup 5, see table III herein, step 1.
- 2/ The electrical measurements for table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are as follows:
- Subgroup 3, see table III herein, step 1.
 - Subgroup 6, see table III herein, step 1.
- 3/ The electrical measurements for table VII of MIL-PRF-19500 are as follows:
- Subgroup 2, see table III herein, step 1 (JANS).
 - Subgroup 6, see table III herein, step 1 and 2 (JANS), step 1 (JAN, JANTX, and JANTXV).
- 4/ Devices which exceed the group A limits for this test shall not be accepted.



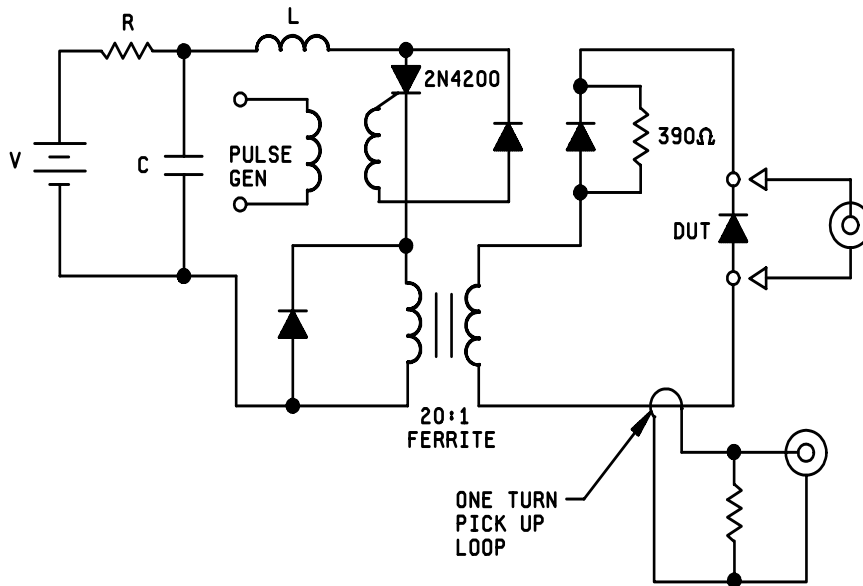
Maximum lead temperature in °C (T_L) at point d from body (see table below).
 For maximum operating junction temperature of +175°C with equal two-lead conditions.

d (see notes 1 and 2)		$R_{\theta JL}$
Dimensions		°C/W
Inches	mm	
.000	(0.00)	7
.125	(3.18)	18
.250	(6.35)	29
.375	(9.53)	38
.500	(12.70)	45
.750	(19.05)	62
1.000	(25.40)	76

NOTES:

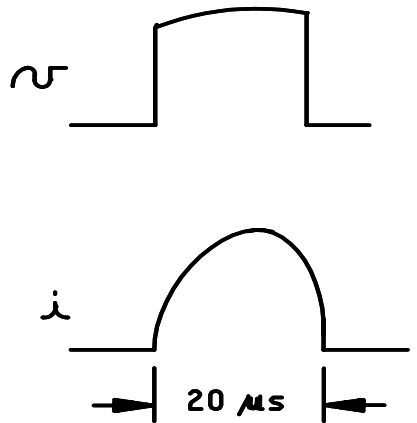
1. Lead distance point d and thermal resistance data.
2. Thermal resistance test performed at .375 inch (9.53 mm).
3. $R_{\theta JEC} \leq 7^\circ\text{C/W}$.

FIGURE 6. Maximum power versus lead temperature.



NOTES:

1. L - 13T #22 pm 1 inch (25.4 mm) diameter form (air core).
2. C - 1 to 10 μ fd to give a 20 μ s pulse width.
3. V - adjustable to 200 volts for power desired in D.U.T.



TYPICAL WAVE FORMS

FIGURE 7. Peak reverse power measurement circuit and waveform.

5. PACKAGING

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

6. NOTES

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

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

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation and if required, the specific issue of individual documents referenced (see 2.2.1).
- c. The lead finish as specified (see 3.4.1).
- d. Type designation and quality assurance level.
- e. Packaging requirements (see 5.1).
- f. For die acquisition, the JANHC or JANKC letter version shall be specified (see figures 4 and 5).

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) No.19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC-VQE, P.O. Box 3990, Columbus, OH 43216-5000.

6.4 Suppliers of die. The qualified die suppliers with the applicable letter version (e.g., JANHCA1N5615) will be identified on the Qualified Manufacturers List (QML).

JANHC and JANKC ordering information		
PIN	Manufacturer	
	14552	33178
1N5615	JANHCA1N5615 JANKCA1N5615	JANHCB1N5615 JANKCB1N5615
1N5617	JANHCA1N5617 JANKCA1N5617	JANHCB1N5617 JANKCB1N5617
1N5619	JANHCA1N5619 JANKCA1N5619	JANHCB1N5619 JANKCB1N5619
1N5621	JANHCA1N5621 JANKCA1N5621	JANHCB1N5621 JANKCB1N5621
1N5623	JANHCA1N5623 JANKCA1N5623	JANHCB1N5623 JANKCB1N5623

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - CR
Navy - NW
Air Force - 11
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

(Project 5961-2441)

Review activities:

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

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/429G	2. DOCUMENT DATE 011018
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3. DOCUMENT TITLE
SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER, FAST RECOVERY TYPES 1N5615, 1N5617, 1N5619, 1N5621, 1N5623, 1N5615UL, 1N5617UL, 1N5619UL, 1N5621UL, 1N5623UL, 1N5615US, 1N5617US, 1N5619US, 1N5621US, 1N5623US, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial DSN FAX EMAIL 614-692-0510 850-0510 614-692-6939 alan.barone@dscclia.mil		
c. ADDRESS Defense Supply Center, Columbus ATTN: DSCC-VAC, P.O. Box 3990 Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman, Suite 2533, Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888		