INCH-POUND

This documentation and process conversion measures necessary to comply with this revision shall be completed by 26 October 1999.

MIL-PRF-19500/420E
26 August 1999
SUPERSEDING
MIL-S-19500/420D
22 July 1994

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER, RECTIFIER, GENERAL PURPOSE
TYPES 1N5550 THROUGH 1N5554, 1N5550US THROUGH 1N5554US
JAN, JANTX, JANTXV, JANJ, 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, general purpose, semiconductor diodes. Five levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figure 1 (similar to D0-41) for 1N5550 through 1N5554, figure 2 for 1N5550US through 1N5554US, and figures 3, 4, 5, 6, and 7 for JANHC and JANKC die.

1.3 Maximum ratings. Unless otherwise specified, T_A = +25°C and ratings apply to all case outlines.

Type	$V_{(BR)min}$	V_{RWM} V dc	I_{O1} T_L = +55°C; L = .375 inch 1/ 2/ 3/	I_{FSM} I_O = 2 A dc t_p = 1/120 s T_A = +55°C	T_{op}, T_{STG} (T_J)	I_{O2} T_A = +55°C 2/ 4/
			A dc	A(pk)	°C	A dc
1N5550, 1N5550US	240	200	5	100	-65 to +175	3
1N5551, 1N5551US	460	400	5	100	-65 to +175	3
1N5552, 1N5552US	660	600	5	100	-65 to +175	3
1N5553, 1N5553US	880	800	5	100	-65 to +175	3
1N5554, 1N5554US	1,100	1,000	5	100	-65 to +175	3

1/ Derate linearly at 41.6 mA/°C above T_L = +55°C at L = .375 inch (see 6.4).
2/ An I_O of up to 6 A dc is allowable provided that appropriate heat sinking or forced air cooling maintains the maximum junction temperature at or below +175°C as proven by the junction temperature rise test (see 6.4).
Barometric pressure reduced:
1N5550, 1N5551, 1N5552 - 8 mmHg (100,000 feet).
1N5553, 1N5554 - 33 mmHg (70,000 feet).
3/ Does not apply to surface mount devices.
4/ Derate linearly at 25 mA/°C above T_A = +55°C.

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

AMSC N/A FSC 5961

1.4 Primary electrical characteristics. Unless otherwise specified, T_A = +25°C.

Type	V_f at I_f = 9.0 A(pk) 2% duty cycle, 8.3 ms max pulse width		I_{R1}		I_{R2} at T_A = +100°C	
	Min V(pk)	Max V(pk)	µA dc (max) at V_R (V dc)		µA dc (max) at V_R (V dc)	
1N5550, 1N5550US	0.6	1.2	1.0	200	75	200
1N5551, 1N5551US	0.6	1.2	1.0	400	75	400
1N5552, 1N5552US	0.6	1.2	1.0	600	75	600
1N5553, 1N5553US	0.6	1.3	1.0	800	75	800
1N5554, 1N5554US	0.6	1.3	1.0	1,000	75	1,000

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 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

MILITARY

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

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Defense Automated Printing Service, 700 Robbins Avenue, Building 4D (DPM-DODSSP), 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 (except for related associated specifications or specification sheets), 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 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.7).

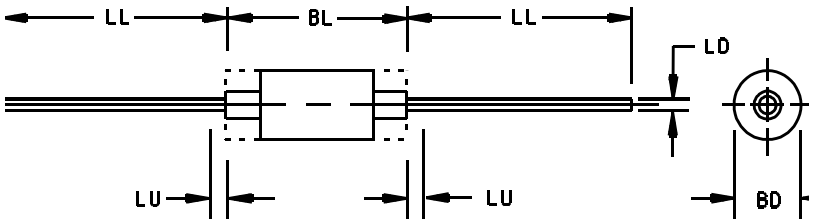
3.2 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500 and as specified herein.

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used in this specification are defined in MIL-PRF-19500 and as defined herein.

US Unleaded or surface mounted (square encapped diodes).

3.4 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and herein.

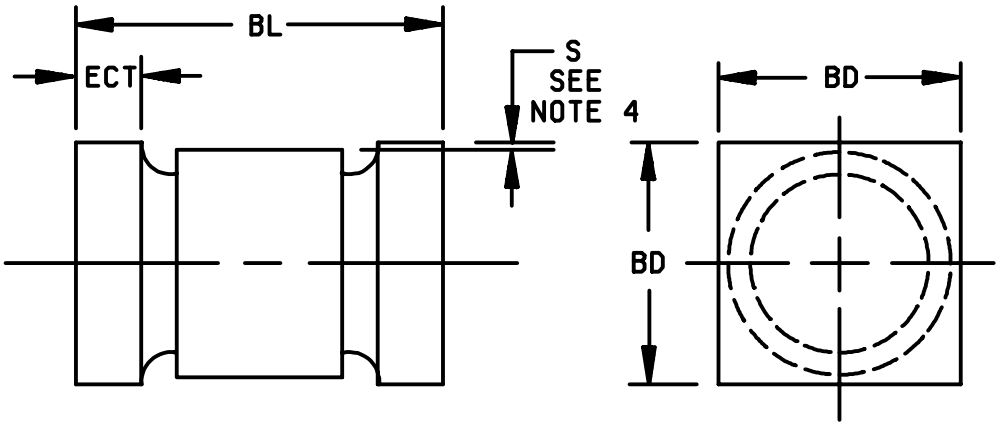
3.4.1 Lead finish. Lead finish shall be in accordance with MIL-STD-750, MIL-PRF-19500, and herein.



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BL	.130	.300	3.30	7.62	3
BD	.115	.180	2.92	4.57	3, 4
LD	.037	.042	0.94	1.07	
LL	.900	1.300	22.86	33.02	

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions BL and BD include all components of the diode periphery except the sections of leads over which the diameter is controlled.
4. Dimension BD shall be measured at the largest diameter.

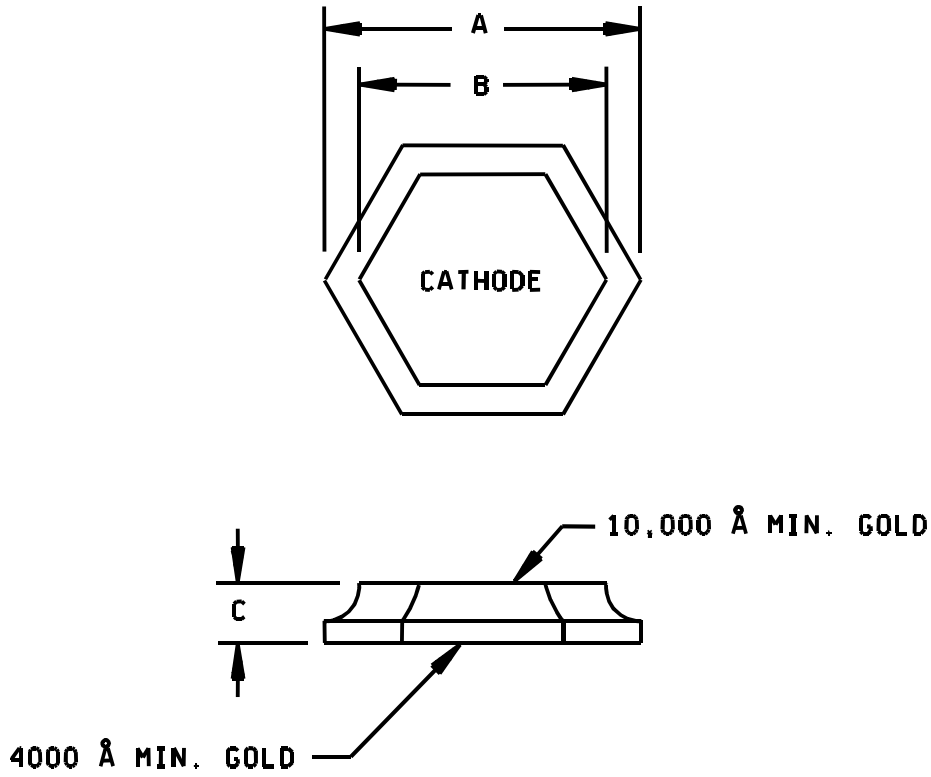
FIGURE 1. Physical dimensions of diode 1N5550 through 1N5554, (similar to DO-41).



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.200	.275	5.08	6.99
BD	.137	.180	3.48	4.57
ECT	.019	.034	0.48	0.86
S	.003	- - -	0.08	- - -

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.

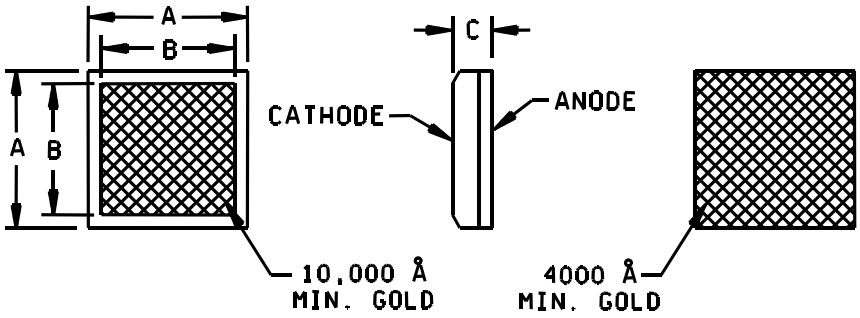
FIGURE 2. Physical dimensions of 1N5550US through 1N5554US.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.085	.091	2.16	2.31
B	.072	.078	1.83	1.98
C	.008	.014	0.20	0.36

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

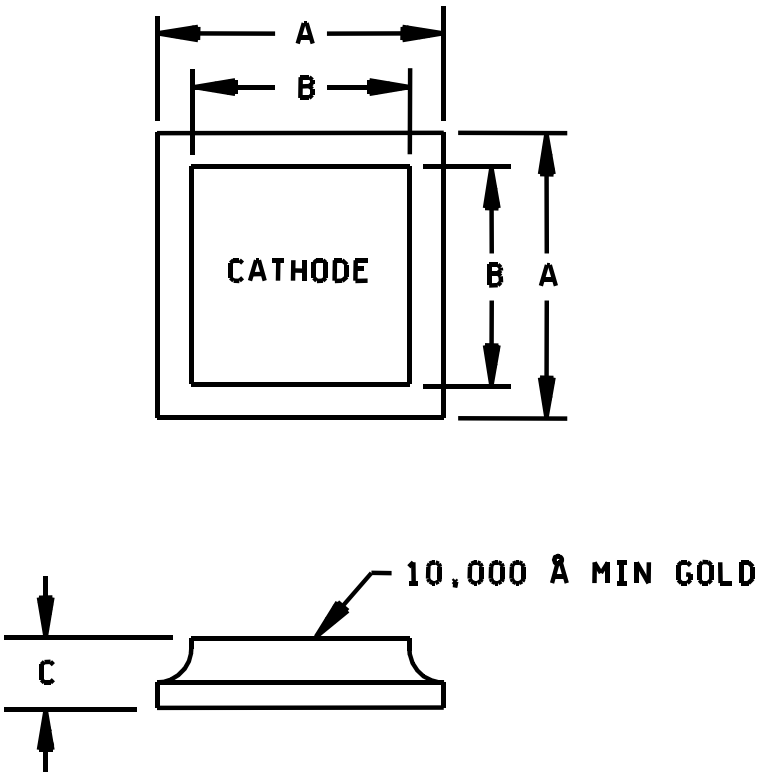
FIGURE 3. JANHCA and JANKCA (A-version) die dimensions.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.088	.092	2.24	2.34
B	.070	.077	1.78	1.96
C	.007	.035	0.18	0.89

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

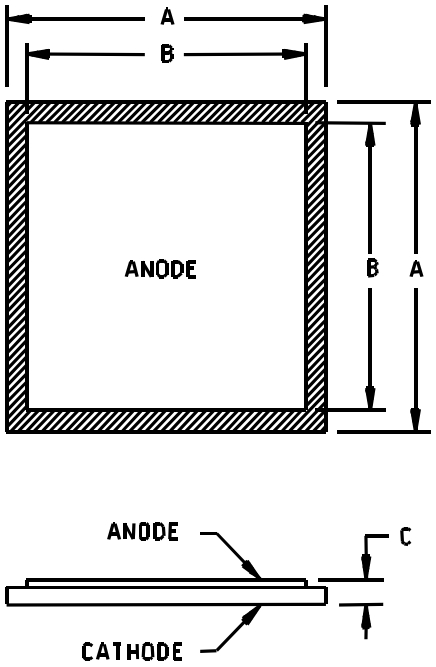
FIGURE 4. JANHCB (B-version) die dimensions.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.060	.065	1.52	1.65
B	.052	.058	1.32	1.47
C	.008	.014	0.20	0.36

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 5. JANHCC (C-version) die dimensions.

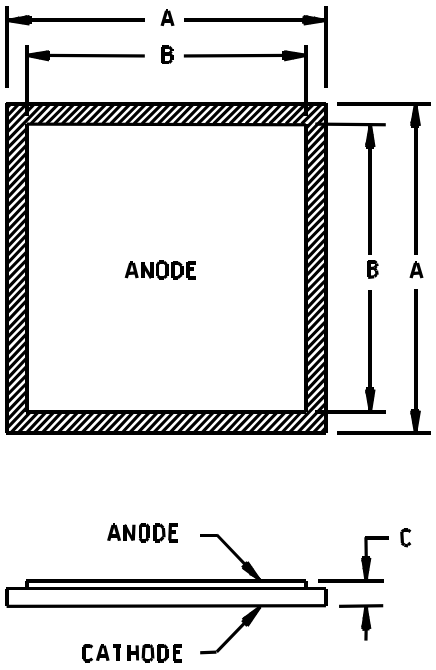


Letter	Inches		Millimeters	
	Min	Max	Min	Max
A	.081	.087	2.05	2.20
B	.055	.061	1.40	1.55
C	.007	.012	0.18	0.30

Notes:

1. Anode is Aluminum at 60,000 A minimum.
2. Cathode is gold at 2,500 A nominal.

FIGURE 6. JANHCD and JANKCD (D-version) die dimensions.



Letter	Inches		Millimeters	
	Min	Max	Min	Max
A	.081	.087	2.05	2.20
B	.055	.061	1.40	1.55
C	.007	.012	0.18	0.30

Notes:

1. Anode is Aluminum at 60,000 A minimum.
2. Cathode is Al/Ti/Ni/Ag..

FIGURE 7. JANHCE and JANKCE (E-version) die dimensions.

3.4.2 Diode construction. These devices shall be constructed utilizing non-cavity double plug construction with high temperature metallurgical bonding between both sides of the silicon die and terminal pins. Metallurgical bond shall be in accordance with the requirements of category I in MIL-PRF-19500.

US version devices shall be structurally identical to the non-surface mount devices except for lead terminations.

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

3.5.1 Marking of US version. For US version only, all marking may be omitted from the device except for the cathode marking. All marking which is omitted from the body of the device shall appear on the label of the initial container.

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

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

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

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.

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with MIL-PRF-19500 and table II herein.

4.2.2 JANHC and JANKC die. Qualification shall be in accordance with MIL-PRF-19500, appendix H.

4.2.3 JANJ devices. For JANJ level, 3.3.1 through 3.3.1.3 of MIL-PRF-19500 shall apply, except as modified herein. Supplier imposed requirements as well as alternate screens, procedures, and/or controls shall be documented in the QM plan and must be submitted to the Qualifying Activity for approval. When alternate screens, procedures, and/or controls are used, in lieu of the JANJ screens herein equivalency shall be proven and documented in the QM Plan. Radiation characterization may be submitted in the QM plan at the option of the manufacturer, however, paragraph 3.3.1.1 of MIL-PRF-19500 is not required. Die lot control and rework shall be in accordance with MIL-PRF-19500 paragraph 3.13 and D 3.13.2.1 for JANS level. Lot formation and conformance inspection requirements for JANJ shall be those used for JANTXV devices as a minimum.

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

Screen (see appendix E, table IV of MIL-PRF-19500)	JANS Level	JANJ Level	JANTXV and JANTX Level
1a 1b	Required Required	Not Required Required	Not Required Required (JANTXV only)
2	Not Required	Not Required	Not Required
3a 3b 3c 1/	Required Not Applicable Thermal impedance (see 4.3.3)	Required Not Applicable Thermal impedance (see 4.3.3)	Required Not Applicable Thermal impedance (see 4.3.3)
4	Not Applicable	Not Applicable	Not Applicable
5	Not Applicable	Not Applicable	Not Applicable
6	Not Applicable	Not Applicable	Not Applicable
7a 7b	Not Applicable Required	Not Applicable Required	Not Applicable Required
8	Required	Not Required	Not Required
9	V_{f1} and I_{R1}	V_{f1} and I_{R1}	Not Applicable
10	Method 1038, condition A	Method 1038, condition A	Method 1038, condition A
11	V_{f1} and I_{R1}; $\Delta V_{f1} \leq \pm 0.1$ V dc ΔI_{R1} ±250 nA dc or 100 percent of initial value whichever is greater.	V_{f1} and I_{R1}; $\Delta V_{f1} \leq \pm 0.1$ V dc ΔI_{R1} ±250 nA dc or 100 percent of initial value whichever is greater.	V_{f1} and I_{R1}
12	Required See 4.3.1	Required T = 240 hours See 4.3.1	Required See 4.3.1
13	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 250 nA dc, whichever is greater. $\Delta V_{f1} \leq \pm .1$ V dc change from initial value. Scope display evaluation (see 4.5.3)	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 250 nA dc, whichever is greater. $\Delta V_{f1} \leq \pm .1$ V dc change from initial value. Scope display evaluation (see 4.5.3)	Subgroup 2 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 250 nA dc, whichever is greater. $\Delta V_{f1} \leq \pm .1$ V dc change from initial value. Scope display evaluation (see 4.5.3)
14a 14b	Not Applicable Optional	Not Applicable Optional	Not Applicable Optional
15	Required	Not Required	Not Required
16	Required	Required	Not Required
17	Not Required	Required Subgroup 2 of table I herein	Not Required

1/ Thermal impedance shall be performed any time after screen 3.
2/ Except thermal impedance, if already performed.

4.3.1 Power burn-in test conditions. Power burn-in conditions (all levels) are as follows (see 4.5.1): T_A = room ambient as defined in the general requirements of 4.5 of MIL-STD-750; V_R = full rated V_{RWM} (see 1.3); f = 50-60 Hz, I_O = 3 A dc.

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

4.3.3 Thermal impedance $Z_{\theta JX}$ measurements for screening. The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3101. The maximum screen limit shall be developed by the supplier using statistical methods and it shall not exceed the Group A, Subgroup 2 herein.

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 MIL-STD-750, method 3101 (read and record date $Z_{\theta JX}$). $Z_{\theta JX}$ shall be supplied on one lot (500 pieces minimum and a thermal response curve shall be submitted.) Twenty-two of these samples shall be serialized and provided to the qualifying activity for correlation prior to shipment of parts. Measurements conditions shall be in accordance with 4.4.1.

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

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 $Z_{\theta JX}$, group A inspection: $Z_{\theta JX} \leq 1.5°C/W$.

I_M .....1 mA to 10 mA.

I_H.....5 A minimum.

t_H.....10 ms.

t_{MD} .....100 μs maximum.

t_{SW}.....5 μs maximum.

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, JANJ JANTX and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) requirements shall be in accordance with the applicable inspections of table I, group A, subgroup 2 herein except $Z_{\theta JX}$ shall be performed after intermittent life only. For delta requirements see 4.5.6.

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

Subgroup	Method	Condition
B3	4066	I_{FSM} = 100 A(pk), 10 surges of 8.3 ms each at 1-minute intervals, superimposed on I_O = 2 A dc; V_R = rated V_{RWM} (see 1.3); T_A = +55°C. This test shall be performed on each sublot. For mounting conditions, see 4.5.1.1 and 4.5.1.2.
B4	1036	I_O = 3 A dc; f = 50-60 Hz; T_A = room ambient as defined in the general requirements of (see 4.5) of MIL-STD-750. V_R = maximum rated V_{RWM} (see 1.3 and 4.5.1); $t_{on} = t_{off}$ = 3 minutes minimum for 2,000 cycles.
B5	1027	T_A = +150°C minimum, I_O = 3 A dc minimum. Adjust T_A or I_O as required by the corresponding chosen value of T_A or I_O to achieve a lot T_J = +275°C. Delta limits: $\Delta I_R \leq$ 100 percent or 50 nA, whichever is greater.
B6	4081 or 3101	T_L = +25°C to +35°C; $R_{\theta JL}$ = 22°C/W maximum. L = .375 inch; $R_{\theta J}$ endcap = 11°C/W maximum (US version).
B7		Peak reverse power: See figure 11 and 4.5.6; PRM = 1,000 watts (minimum). This test shall be performed on each sublot. n = 22, c = 0.

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

Subgroup	Method	Condition
B3	1027	I_O = 3 A dc minimum. adjust I_O or T_A to achieve T_J = 150°C minimum; f = 50-60 Hz; T_A = room ambient as defined in the general requirements of of MIL-STD-750 (see 4.5). V_R = rated V_{RWM} (see 1.3 and 4.5.1). For mounting conditions see 4.5.1.1 and 4.5.1.2.
B7		Peak reverse power: See figures 11 and 4.5.6; PRM = 1,000 watts (minimum). This test shall be performed on each sublot. n = 22, c = 0.

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) and delta requirements shall be in accordance with the applicable inspections of table I, group A, subgroup 2 and 4.5.6.

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

Subgroup	Method	Condition
C2	1056	Test condition B
C2	2036	Test condition A Tension: Weight = 5 pounds; t = 15 seconds Fatigue: Test condition E; weight = 2 pounds NOTE: Terminal strength not applicable for US version devices.
C2	1021	Omit initial conditioning.
C5		Not applicable.
C6	1026	I_O = 3 A dc minimum. adjust I_O or T_A to achieve T_J = 150°C minimum; f = 50-60 Hz; T_A = room ambient as defined in the general requirements of of MIL-STD-750 (see 4.5). V_R = rated V_{RWM} (see 1.3 and 4.5.1); for mounting conditions, see 4.5.1.1 and 4.5.1.2.

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

4.5.1 Steady-state operation life. A half-sine wave of the specified peak voltage shall be 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 not be greater than 180° nor less than 150°.

4.5.1.1 Mounting conditions. At the option of the manufacturer, any clips or heat sink mounting configurations may be utilized provided that I_O is increased so that the junction temperature of each diode is maintained at +145°C minimum.

4.5.1.2 Alternate mounting conditions (for -US devices). At the option of the manufacturer, any clips or heat sink mounting configurations may be utilized provided that one of the following conditions be met:

a. T_{EC} = +75°C to +125°C, V_{RWM} = rated, f = 50-60 Hz, I_O = 3 amps.

b. Temporary attachment of leads or equivalent (thermal properties not to exceed the leaded part) f = 50-60 Hz. I_O = 3 amps, T_J = +145°C minimum, V_R = rated V_{RWM}.

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

4.5.3 Scope display evaluation. Scope display evaluation shall be in accordance with test method 4023 of MIL-STD-750.

4.5.4 Junction temperature rise test. This test shall be performed in accordance with 4.5.4.1 and figures 8, 9, and 10.

4.5.4.1 Test procedure. Determine the temperature coefficient of forward voltage (TCV_F) using a lower reference temperature, (T_1) of +25°C to +30°C, an upper reference temperature (T_2) of +150°C to +200°C, and a reference current (I_{REF}) of 1 to 10 mA dc.

$$TCV_F = \frac{V_{F1} - V_{F2}}{T_2 - T_1}$$

Where $V_{F1} = V_F$ at I_{REF} at T_1 and

$V_{F2} = V_F$ at I_{REF} at T_2

At the option of the manufacturer, an average TCV_F based on a random sample of at least 25 production rectifiers may be used in the determination of ΔT_J. The diode shall be mounted at the specified lead length, and with S1 open (I_O = 0) read $V_{FO} = V_F$ at I_{REF}. Close S1 and adjust the power source and R_L for the specified I_O. After thermal equilibrium has been established at the specified lead temperature (T_L), read $V_{F3} = V_F$ at I_{REF} at 250 ± 150 µs after the power pulse. I_{REF} shall be within ±1 percent of the value used for calibration. Forced moving air or draft shall not be permitted across the devices during test.

$$\Delta T_J = \frac{V_{FO} - V_{F3}}{TCV_F}$$

4.5.5 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 $R_{\theta JL} \leq 22°C/W$ for L = .375; $R_{\theta JL} \leq 11°C/W$ for L= 0 (US version). The following conditions shall apply:

a. I_H .....2 A minimum.

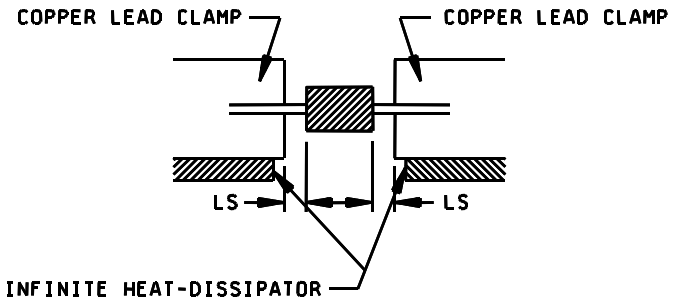
b. t_H .....Thermal equilibrium.

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 = 9.53 mm (.375 inch) minimum for leaded devices and LS = 0 minimum for unleaded devices as defined (Metric equivalents are given for general information only):



4.5.6 Delta requirements. Delta requirements shall be as specified below:

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Reverse current leaking change	4016	DC method	ΔI_{R1} 3/		±100 percent of initial value or ±250 nA dc, whichever is greater.	
2.	Forward voltage change	4011	I_F = 1.5 A dc; pulsed (see 4.5.1)	ΔV_{F1} 3/		±50 mV dc maximum change from previous measured value.	

1/ The electrical measurements for table VIa (JANS) of MIL-PRF-19500 are as follows:

a. Subgroup 3, see table II herein, step 2.

b. Subgroup 4, see table II herein, step 2.

c. Subgroup 5, see table II herein, steps 1 and 2.

2/ The electrical measurements for table VIb (JAN, JANJ, JANTX and JANTXV) of MIL-PRF-19500 are as follows:

a. Subgroup 3, see table II herein, step 1.

b. Subgroup 6, see table II herein, step 1.

3/ Devices which exceed the group A limits for this test shall not be accepted.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Thermal impedance	3101	See 4.3.3	$Z_{\theta JX}$		1.5	°C/W
Forward voltage	4011	I_f = 9.0 A(pk); duty cycle ≤ 2 percent (pulsed); t_p ≤ 8.3 ms	V_{f1}			
1N5550, 1N5550US				0.6	1.2	V(pk)
1N5551, 1N5551US				0.6	1.2	V(pk)
1N5552, 1N5552US				0.6	1.2	V(pk)
1N5553, 1N5553US				0.6	1.3	V(pk)
1N5554, 1N5554US				0.6	1.3	V(pk)
Forward voltage	4011	I_F = 1.5 A dc	V_{F1}	0.5	1.0	V dc
Reverse current leakage	4016	DC method	I_{R1}			
1N5550, 1N5550US		V_R = 200 V dc			1.0	µA dc
1N5551, 1N5551US		V_R = 400 V dc			1.0	µA dc
1N5552, 1N5552US		V_R = 600 V dc			1.0	µA dc
1N5553, 1N5553US		V_R = 800 V dc			1.0	µA dc
1N5554, 1N5554US		V_R = 1,000 V dc			1.0	µA dc
Breakdown voltage (diodes)	4021		V_{BR1}			
1N5550, 1N5550US		I_R = 50 µA dc		240		V dc
1N5551, 1N5551US		I_R = 50 µA dc		460		V dc
1N5552, 1N5552US		I_R = 50 µA dc		660		V dc
1N5553, 1N5553US		I_R = 50 µA dc		880		V dc
1N5554, 1N5554US		I_R = 50 µA dc		1,100		V dc
Subgroup 3						
High temperature operation:		T_A = +100°C				
Reverse current leakage	4016	DC method	I_{R2}			
1N5550, 1N5550US		V_R = 200 V dc			75	µA dc
1N5551, 1N5551US		V_R = 400 V dc			75	µA dc
1N5552, 1N5552US		V_R = 600 V dc			75	µA dc
1N5553, 1N5553US		V_R = 800 V dc			75	µA dc
1N5554, 1N5554US		V_R = 1,000 V dc			75	µA dc

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 3 - Continued						
Forward voltage	4011	I_f = 9.0 A(pk); duty cycle ≤ 2 percent (pulsed); t_p ≤ 8.3 ms	V_{f2}			
1N5550, 1N5550US					1.2	V(pk)
1N5551, 1N5551US					1.2	V(pk)
1N5552, 1N5552US					1.2	V(pk)
1N5553, 1N5553US					1.3	V(pk)
1N5554, 1N5554US					1.3	V(pk)
Low temperature operation:		T_A = -55°C				
Forward voltage	4011	I_f = 9.0 A(pk); duty cycle ≤ 2 percent (pulsed); t_p ≤ 8.3 ms	V_{f3}		1.5	V(pk)
Forward voltage	4011	I_F = 1.5 A dc	V_F	0.5	1.2	V dc
Breakdown voltage (diodes)	4021		V_{BR2}			
1N5550, 1N5550US		I_R = 50 μA dc		200		V dc
1N5551, 1N5551US		I_R = 50 μA dc		400		V dc
1N5552, 1N5552US		I_R = 50 μA dc		600		V dc
1N5553, 1N5553US		I_R = 50 μA dc		800		V dc
1N5554, 1N5554US		I_R = 50 μA dc		1,000		V dc
Subgroup 4						
Reverse recovery time	4031	Condition B-1	t_{rr}		2.0	μs
Subgroups 5						
Not applicable						
Subgroup 6						
Surge current	4066	I_{FSM} = 100 A(pk), 10 surges of 8.3 ms each at 1-minute intervals, superimposed on I_O = 2 A dc; V_R = rated V_{RWM} (see 1.3); T_A = +55°C. This test shall be performed on each sublot. For mounting conditions, see 4.5.1.1 and 4.5.1.2.				
Subgroup 7						
Not applicable						

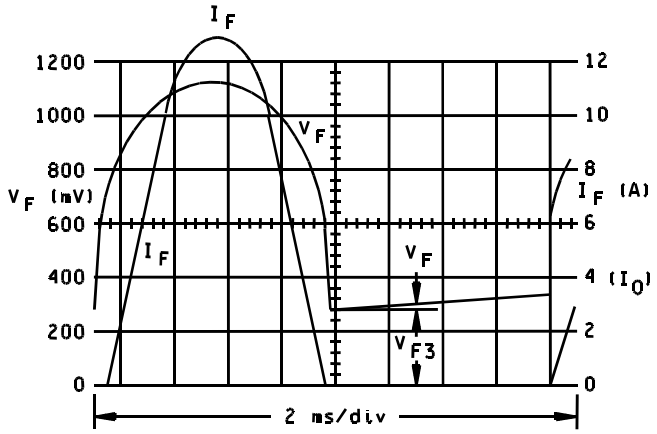
1/ For sampling plan, see MIL-PRF-19500.

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

Inspection	MIL-STD-750		Sampling plan
	Method	Conditions	
Subgroup 1			22 devices c = 0
Temperature cycling	1051	5,000 cycles, condition C	
Electrical measurements 1/		See table I, group A, subgroup 2	
Subgroup 2			22 devices c = 0
Steady-state dc blocking life	1038	1,000 hours, condition A $V_R = V_{RWM}$	
Electrical measurements 1/		See table I, group A, subgroup 2	
Subgroup 3			
Not applicable			
Subgroup 4			22 devices c = 0
Thermal resistance	3101 or 4081	See 4.5.5; $R_{\theta JL}$ = 22°C/W $R_{\theta JEC}$ = 11°C/W	
Junction temperature rise (see 4.5.4)		See figures 8, 9, and 10; $\Delta T_J \leq 120°C$; L = .375 inch; T_L = 55°C; I_O = 5 A dc 2/	
Subgroup 5			22 devices c = 0
Barometric pressure, reduced (altitude operation)	1001	Pressure (see 1.3); t = 1 min. DC method; $V_R = V_{RWM}$ (see 1.3) I_{R1} = 1.0 μA dc maximum	

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

2/ For surface mount device, I_O = 5 A dc and T_{EC} (end cap temperature) = 75°C.



NOTE: Blocking diode shall have a forward current rating ≥ 6 A dc.

FIGURE 8. Junction temperature rise test circuit.

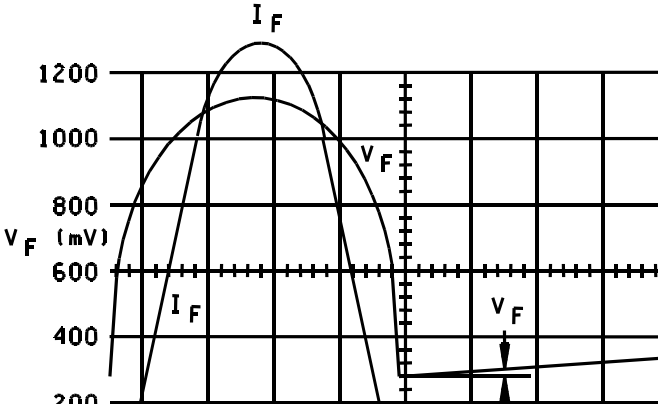


FIGURE 9. Junction temperature test oxcillogram (typical).

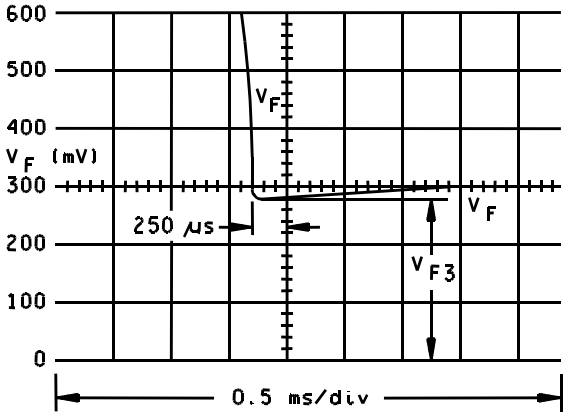
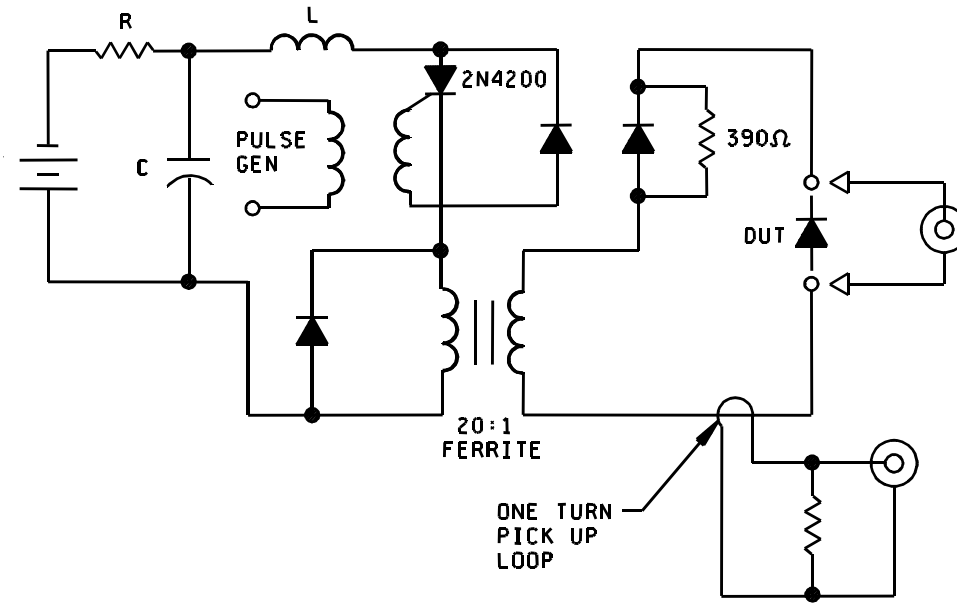


FIGURE 10. Expanded oscillogram of V_F.



NOTES:

1. L = 13T H22 on 1 inch diameter form (air core).
2. C = 1 to 10 μF to give 20 μs pulse width.
3. V = Adjustable to 200 volts for power desired in device under test.

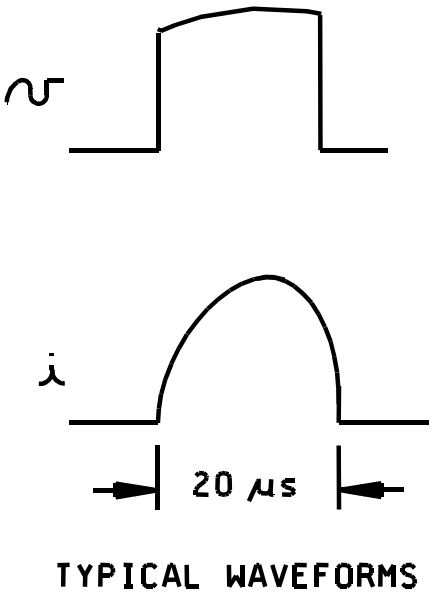
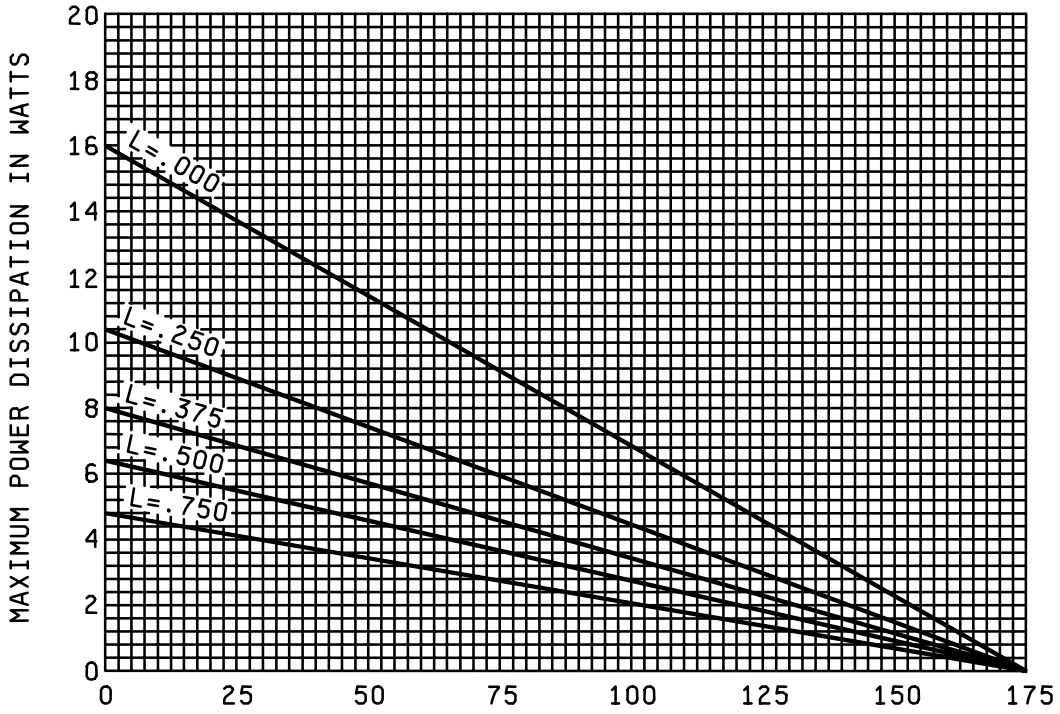


FIGURE 11. Typical peak reverse power measurement circuit and waveforms.

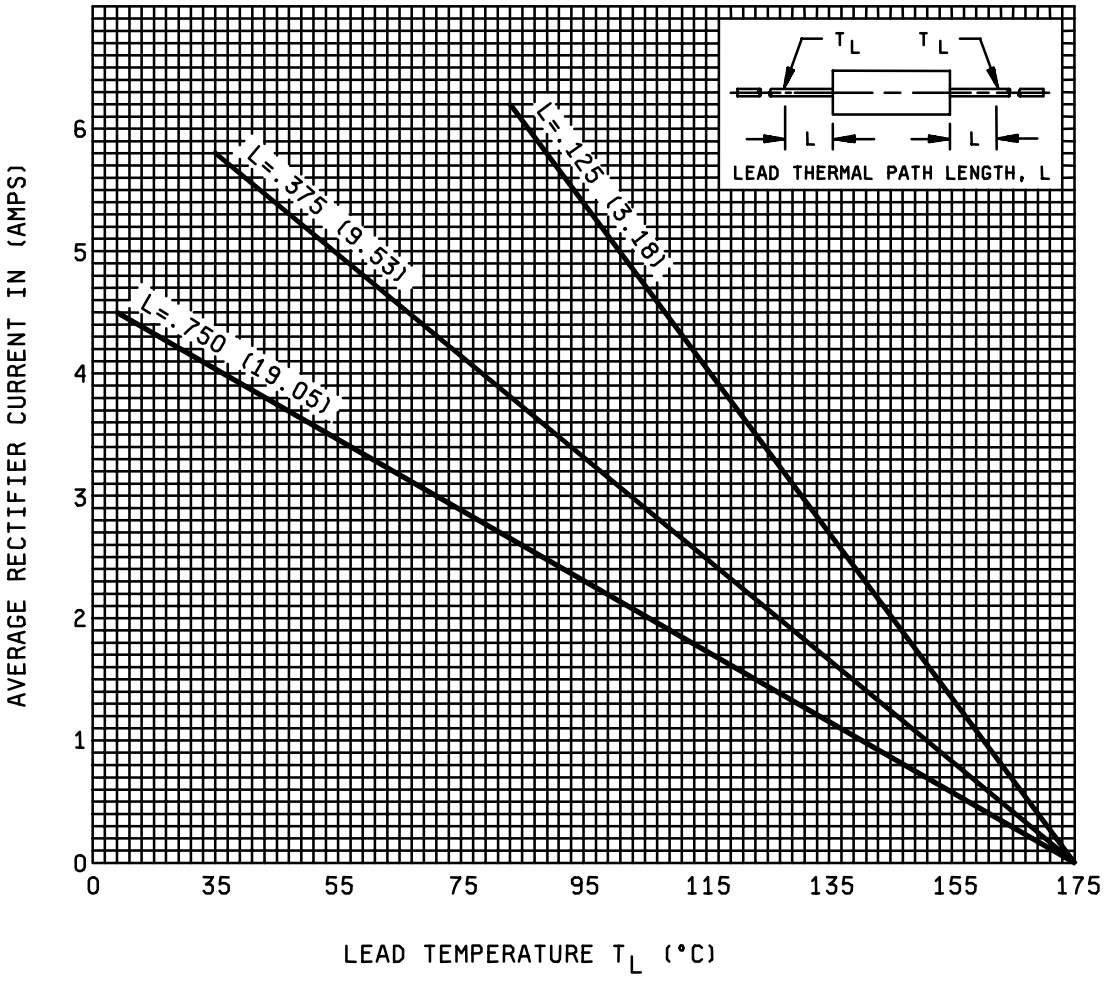


Maximum lead temperature in °C (T_L) at point "L" from body (for maximum operating junction temperature of +175°C with equal two-lead conditions).

L		$R_{\theta JL}$
Inches	mm	°C/W
.000	0.00	11
.250	6.35	16.5
.375	9.53	22
.500	12.70	26
.750	19.05	35.5

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 12. Maximum power in watts versus lead temperature.



NOTES

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 13. Maximum current vs lead temperature.

4.5.7 Peak reverse power test. This test shall be measured in the circuit on figure 11 or equivalent. A 20 microsecond half-sine wave of current shall be used and peak reverse power shall be determined by the product of peak reverse voltage and peak reverse current.

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 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.)

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.2).

b. Lead finish as specified (see 3.4.1).

c. Type designation and product assurance level.

d. Packing requirements (see 5.1)

6.3 Supersession information. Devices covered by this specification supersede the manufacturers' and users' Part or Identifying Number (PIN). This information in no way implies that the manufacturers' PIN's are suitable as a substitute for the military PIN.

6.4 Applications data. Device current capability with lead-dissipators or body forced-air-cooling, may be determined from figure 13, which shows maximum average rectified current versus lead temperature as a function of the distance L from the diode body at which lead temperature is measured. See figure 12 for maximum power in watts as a function of lead temperature at a distance "L" from the diode body.

6.5 Suppliers of die. The qualified die suppliers with the applicable letter version (example JANHCA1N5550) will be identified on the QPL.

JANC ordering information					
PIN	Manufacturer				
	14552	60211	13409	33178	33178
1N5550	JANHCA1N5550 JANKCA1N5550	JANHCB1N5550	JANHCC1N5550	JANHCD1N5550	JANHCE1N5550
1N5551	JANHCA1N5551 JANKCA1N5551	JANHCB1N5551	JANHCC1N5551	JANHCD1N5551	JANHCE1N5551
1N5552	JANHCA1N5552 JANKCA1N5552	JANHCB1N5552	JANHCC1N5552	JANHCD1N5552	JANHCE1N5552
1N5553	JANHCA1N5553 JANKCA1N5553	JANHCB1N5553	JANHCC1N5553	JANHCD1N5553	JANHCE1N5553
1N5554	JANHCA1N5554 JANKCA1N5554	JANHCB1N5554	JANHCC1N5554	JANHCD1N5554	JANHCE1N5554

6.6 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.

6.7 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 Manufacture 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 Defense Supply Center Columbus, ATTN: DSCC-VQE, 3990 East Broad Street, Columbus, OH 43216-5000.

CONCLUDING MATERIAL

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

Preparing activity:
DLA - CC

Review activities:

Army - AR, MI, SM
Navy - AS, CG, MC
Air Force - 19, 80, 99

(Project 5961-2157)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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2. The submitter of this form must complete blocks 4, 5, 6, and 7.

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I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-19500/420E	**2. DOCUMENT DATE (YYMMDD)**

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER, RECTIFIER, GENERAL PURPOSE, TYPES 1N5550 THROUGH 1N5554, 1N5550US THROUGH 1N5554US, JAN, JANTX, JANTXV, JANJ, 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) (1) Commercial (2) DSN (If applicable) (3) E-Mail	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Alan Barone	b. TELEPHONE (Include Area Code) (1) Commercial 614-692-0510	(2) DSN 850-0510	(3) E-Mail alan_barone@dscc.dla.mil
c. ADDRESS (Include Zip Code) Defense Supply Center Columbus ATTN: DSCC-VAC 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 Road, Suite 2533, Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888		

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