

This documentation process conversion measures necessary to comply with this revision shall be completed by 30 September 1999.

INCH-POUND

MIL-PRF-19500/411H
30 July 1999
SUPERSEDING
MIL-S-19500/411G
1 February 1994

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER, FAST RECOVERY
1N5415 THROUGH 1N5420, 1N5415US THROUGH 1N5420US,
JAN, JANTX, JANTXV, JANS, JANJ, JANTXVM, JANTXVD, JANTXVR,
JANTXVH, JANSM, JANSJ, JANSR, AND JANSH

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 detail requirements for silicon rectifier diodes. Five levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Provision for radiation hardness assurance (RHA) to four radiation test levels is provided for JANTXV and JANS product assurance levels. RHA level designators "M", "D", "R", and "H" are appended to the device prefix to identify devices which have passed RHA requirements.

1.2 Physical dimensions. See figures 1 (Similar to D0-41) and 2.

1.3 Maximum ratings.

Types	V _R	V _{RWM}	I _O 1/ T _A = 55°C 2/	I _O 1/ T _A = 100°C 3/	I _{FSM} I _O = 2 A dc T _A = 100°C t _p = 8.3 ms	t _{rr}	T _{STG} and T _J	R _{θJL} at L = .375	R _{θJEC} at L = 0 for US versions
	V dc	V (pk)	A dc	A dc	A (pk)	ns	°C	°C/W	°C/W
1N5415, 1N5415US	50	50	3	2	80	150	-65 to +175	20	10
1N5416, 1N5416US	100	100	3	2	80	150	-65 to +175	20	10
1N5417, 1N5417US	200	200	3	2	80	150	-65 to +175	20	10
1N5418, 1N5418US	400	400	3	2	80	150	-65 to +175	20	10
1N5419, 1N5419US	500	500	3	2	80	250	-65 to +175	20	10
1N5420, 1N5420US	600	600	3	2	80	400	-65 to +175	20	10

1/ I_O rating is independent of heat sinking, special mounting or forced air across the body or leads of the device.

2/ Derate linearly at 22 mA/°C for 55°C ≤ T_A ≤ 100°C.

3/ Derate linearly at 27 mA/°C for 100°C ≤ T_A ≤ 175°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
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FSC 5961

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 - Performance Specification 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 6.4).

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 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 figures 1 and 2 herein.

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

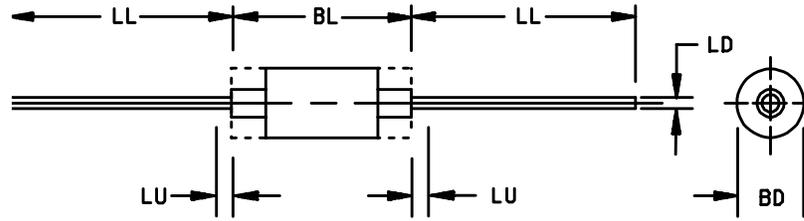
3.4.2 Encapsulant material. In addition to those categories of hermetically sealed package requirements specified in MIL-PRF-19500, fused-metal-oxide to metal shall also be acceptable.

3.4.3 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.

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

3.5.1 Marking for US devices. For US version devices only, all marking may be omitted from the body (except for 3.6), but shall be retained on the initial container.

3.6 Polarity. Alternatively, the polarity of all types shall be indicated with a contrasting color band to denote the cathode end. For US suffix devices a minimum of three contrasting color dots spaced around the cathode end of the device shall be used.

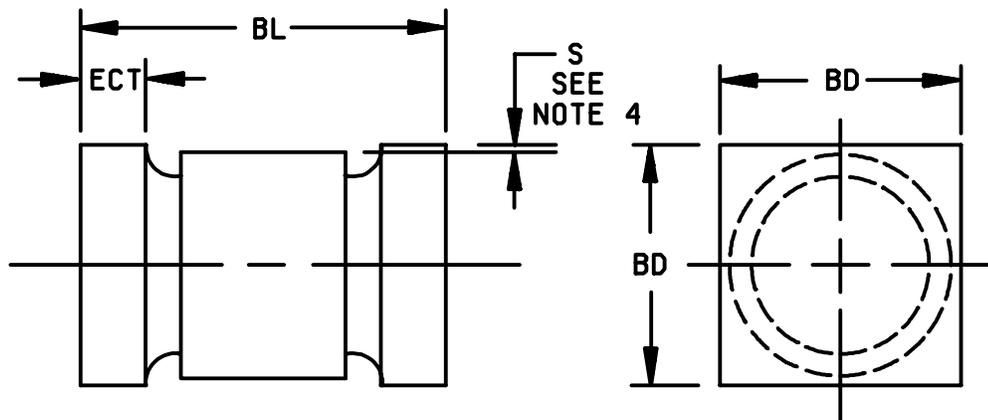


Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.110	.180	2.79	4.57	3
LD	.037	.042	0.94	1.07	4
BL	.130	.260	3.30	6.60	4
LL	.90	1.30	22.9	33.0	

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. The BL dimension shall include all uncontrolled areas of the device leads.

FIGURE 1. Physical dimensions. (Similar to D0-41)



Symbol	Dimension			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.200	.225	5.080	5.72
ECT	.019	.028	0.48	0.71
S	.003	---	0.08	---
BD	.137	.148	3.48	3.76

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 surface mount family.

3.7 Radiation hardness assurance (RHA). Radiation hardness assurance requirements, part number designators, and test levels shall be as defined in MIL-PRF-19500.

3.7.1 Post irradiation performance characteristics. The electrical performance characteristics of the RHA devices are as specified in 4.4.4 herein.

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

3.9 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 Qualification for radiation hardness assurance. Qualification inspection for radiation hardness assured JANS and JANTXV devices shall consist of group D examinations and tests specified in table IV herein.

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

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.

4.2.4 JANJ Qualification. For JANJ qualification, 4.4.2.1 herein shall be performed as required by the Qualifying Activity.

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	Required	Not Required	Not Required
1b	Required	Required	Required (JANTXV only)
2	Not Required	Not Required	Not Required
3a 3c	Required Thermal impedance (see 4.5.4)	Required Thermal impedance (see 4.5.4)	Required Thermal impedance (see 4.5.4)
4	Not Applicable	Not Applicable	Not Applicable
5	Not Applicable	Not Applicable	Not Applicable
6	Not Applicable	Not Applicable	Not Applicable
7a	Not Applicable	Not Applicable	Not Applicable
7b	Required	Required	Required
8	Required	Not Required	Not Required
9	Required	Required	Not Required
10	Method 1038, condition A	Method 1038, condition A	Method 1038, condition A
11	Required I_{R1} and V_{F1} ; $\Delta I_{R1} \leq 100$ percent of initial reading or 250 nA dc, whichever is greater; $\Delta V_{F1} \leq \pm 0.1$ V dc.	Required I_{R1} and V_{F2}	Required I_{R1} and V_{F2}
12	Required See 4.3.1	Required T = 240 hrs. See 4.3.1	Required See 4.3.1
13 <u>2/</u>	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial value or 250 nA dc, whichever is greater; $\Delta V_{F1} \leq \pm 0.1$ V dc. Scope display evaluation (see 4.5.1)	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial value or 250 nA dc, whichever is greater; $\Delta V_{F2} \leq \pm 0.1$ V dc. Scope display evaluation (see 4.5.1)	Subgroup 2 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial value or 250 nA dc, whichever is greater; $\Delta V_{F2} \leq \pm 0.1$ V dc. Scope display evaluation (see 4.5.1)
14a	Not Applicable	Not Applicable	Not Applicable
14b	Optional <u>1/</u>	Optional <u>1/</u>	Optional <u>1/</u>
15	Required	Not Required	Not Required
16	Required	Required	Not Required
17	Not Required	Required Subgroup 2 of table I herein Verify polarity	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 (see 4.5.2):

Type	V _{RWM}	I _O	f
1N5415, 1N5415US	50 V dc	3 A dc	50-60 Hz
1N5416, 1N5416US	100. V dc	3 A dc	50-60 Hz
1N5417, 1N5417US	200 V dc	3 A dc	50-60 Hz
1N5418, 1N5418US	400 V dc	3 A dc	50-60 Hz
1N5419, 1N5419US	500 V dc	3 A dc	50-60 Hz
1N5420, 1N5420US	600 V dc	3 A dc	50-60 Hz

NOTE: T_A = room ambient as defined in the general requirements of MIL-STD-750, (see 4.5 of MIL-STD-750).

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_{ΘJX}: Z_{ΘJX} = 1.5°C/W.

- I_H.....5 A minimum.
- t_H 10 ms.
- I_M 1 mA to 10 mA.
- t_{MD}..... 100 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 IVa (JANS) and table IVb (JAN, JANJ 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_{ΘJX} need not to be performed. See subgroup conditions for delta limits when applicable.

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

Subgroup	Method	Condition
3	- - -	Peak reverse power: See figure 5 and (see 4.5.3), P _{RM} = 1,000 (minimum) watts.
3	4066	I _{FSM} = 80 A(pk); 10 surges of 8.3 ms each at 1 minute intervals, superimposed on I _O = 2 A dc; V _{RWM} = rated (see 1.3). T _A = 100°C; test each device type subplot.
4	1036	I _O = 3 A dc; T _A = room ambient as defined in the general requirements of MIL-STD-750, (see 4.5); f = 50-60 Hz; V _R = rated V _{RWM} (see 1.3 and 4.5.2); t _{ON} = t _{off} 3 minutes minimum for 2,000 cycles.
5	1027	T _A = 150° minimum, I _O = 3 A (min), or adjust T _A or I _O as required to achieve a lot, T _J = +275°C, +0, -35°C.

Delta limits: ΔI_{R1} ≤ 100 percent of initial value or 250 nA dc, whichever is greater.

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>
2	- - -	Peak reverse power: See figure 5 and (see 4.5.3), $P_{RM} = 1,000$ (minimum) watts.
2	4066	Required on each subplot; $I_{FSM} = 80$ A(pk); 10 surges of 8.3 ms each at 1 minute intervals, superimposed on $I_O = 2$ A dc; $V_{RWM} =$ rated V_{RWM} (see 1.3). $T_A = 100^\circ\text{C}$; test each device type subplot.
3	1027	$I_O = 3$ A dc minimum. adjust I_O or T_A to achieve $T_J = 150^\circ\text{C}$ minimum; $f = 50\text{-}60$ Hz; $V_R =$ rated V_{RWM} (see 1.3 and 4.5.2). Delta limits: $\Delta I_{R1} \leq 100$ percent of initial value or 250 nA dc, whichever is greater.
5	- - -	Not applicable.
6	1032	$T_A = +175^\circ\text{C}$, $t = 340$ hours.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table V 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 subgroup conditions 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>
2	2036	Tension: Test condition A; weight = 20 pounds; $t = 30$ seconds. Lead fatigue: Test condition E; weight 2 pounds. NOTE: Both tension and lead fatigue are not applicable for US devices. Delta limits: $\Delta V_{F1} \leq \pm 0.1$ V dc; $\Delta I_{R1} \leq 100$ percent of initial value or 250 nA dc, whichever is greater.
3	- - -	Not applicable.
6	1026	$I_O = 3$ A dc minimum. adjust I_O or T_A to achieve $T_J = 150^\circ\text{C}$ minimum; $f = 50\text{-}60$ Hz; $V_R =$ rated V_{RWM} (see 1.3 and 4.5.2).

4.4.4 Group D inspection. Radiation hardness assured JANS and JANTXV devices shall include the group D tests specified in table II. These tests shall be performed as required in accordance with MIL-PRF-19500 and MIL-STD-750, method 1019 for total ionizing dose or method 1017 for neutron fluence as applicable.

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

4.5.1 Scope-display evaluation. The reverse breakdown characteristics shall be viewed on an oscilloscope with display calibration factors of 5 to 20 μA per division and 50 to 100 V per division. Reverse current over the knee shall be at 50 μA . Each device shall exhibit a sharp knee characteristic and any discontinuity or dynamic instability of the trace shall be cause for rejection. See MIL-STD-750C, method 4023.

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

4.5.2.1 Alternate mounting conditions. At the option of the manufacturer, any mounting configuration may be utilized providing the following conditions are met:

- a. $I_O(\text{min}) = I_O$ rated at 55°C (see 1.3). $V_R =$ rated V_{RWM} . $f = 50\text{-}60$ Hz.
- b. For leaded devices and US devices with temporary leads. $T_A =$ room ambient as defined in MIL-STD-750. For US devices without temporary leads, $T_{EC} = +75^\circ\text{C}$ minimum.
- c. Increase T_A , T_{EC} , or I_O as required to give a minimum T_J of $+145^\circ\text{C}$.

4.5.3 Peak reverse power test. This test shall be measured in the circuit of figure 5, 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.

4.5.4 Thermal impedance ($Z_{\theta JX}$ measurements). The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3101. Suppliers shall identify and delete atypical devices.

4.5.4.1 Thermal impedance ($Z_{\theta JX}$ measurements) for initial qualification or requalification. The $Z_{\theta JX}$ measurement 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 devices 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.

4.5.5 Thermal resistance. Thermal resistance measurement shall be performed in accordance with MIL-STD-750, method 3101 or 4081. 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 $R_{\theta JL(\text{max})} = 20^\circ\text{C/W}$ for $L = .375$; $R_{\theta JL(\text{max})} = 10^\circ\text{C/W}$ for $L = 0$ (US version). The following conditions shall apply:

I_H	3 A.
t_H	25 seconds minimum.
I_M	1 mA to 10 mA.
t_{MD}	70 μs maximum.

LS = Lead spacing = 3/8 inch as defined on figure 3 below:

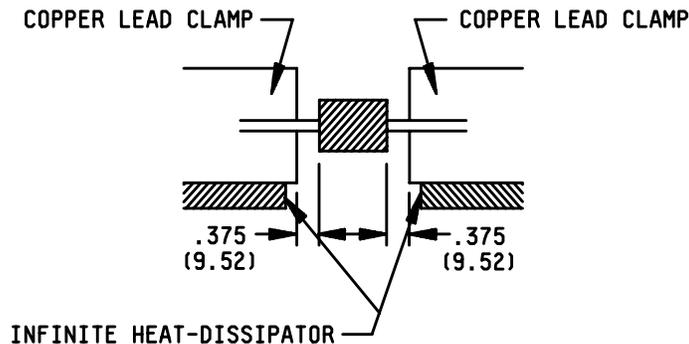


FIGURE 3. Mounting arrangement.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance	3101	See 4.4.1	$Z_{\Theta JX}$	---	1.5	°C/W
Forward voltage	4011	$I_F = 1.5$ A dc	V_{F1}	0.5	1.2	V dc
Forward voltage	4011	$I_F = 9$ A dc (pulsed); $t_p = 300$ μ s; 2% maximum duty cycle	V_{F2}	0.6	1.5	V (pk)
Reverse current	4016	DC method $V_R =$ rated (see 1.3)	I_{R1}	---	1.0	μ A dc
Breakdown voltage	4021	$I_R = 50$ μ A dc	$V_{(BR)1}$			
1N5415, 1N5415US				50	---	V dc
1N5416, 1N5416US				100	---	V dc
1N5417, 1N5417US				200	---	V dc
1N5418, 1N5418US				400	---	V dc
1N5419, 1N5419US				500	---	V dc
1N5420, 1N5420US				600	---	V dc
<u>Subgroup 3</u>						
high temperature operation:		$T_A = +100^\circ\text{C}$				
Reverse current	4016	DC method; $V_R =$ rated (see 1.3)	I_{R2}		20	μ A dc
Low temperature operation:		$T_A = -55^\circ\text{C}$				
Forward voltage	4011	$I_F = 0.5$ A dc	V_{F3}	0.5	1.4	V dc
Breakdown voltage	4021	$I_R = 50$ μ A dc	$V_{(BR)2}$			
1N5415, 1N5415US				50	---	V dc
1N5416, 1N5416US				100	---	V dc
1N5417, 1N5417US				200	---	V dc
1N5418, 1N5418US				400	---	V dc
1N5419, 1N5419US				500	---	V dc
1N5420, 1N5420US				600	---	V dc

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
<u>Subgroup 4</u>						
Reverse recovery time	4031	Condition B1	t_{rr}			
1N5415, 1N5415US				---	150	ns
1N5416, 1N5416US				---	150	ns
1N5417, 1N5417US				---	150	ns
1N5418, 1N5418US				---	150	ns
1N5419, 1N5419US				---	250	ns
1N5420, 1N5420US				---	400	ns
Capacitance	4001	$V_R = 4 \text{ V dc};$ $100 \text{ KHz} \leq f \leq 1 \text{ Mhz}$	C			
1N5415, 1N5415US				---	550	pF
1N5416, 1N5416US				---	430	pF
1N5417, 1N5417US				---	250	pF
1N5418, 1N5418US				---	165	pF
1N5419, 1N5419US				---	140	pF
1N5420, 1N5420US				---	120	pF
<u>Subgroups 5, 6, and 7</u>						
Not applicable						

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

TABLE II. Group D inspection and end-point limits for radiation hardness assured JANS and JANTXV devices only.

Inspection ^{1/}	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
<u>Subgroup 1</u>						
Neutron irradiation	1017					
Electrical measurements		I _F = 9 A dc, pulsed	V _F			
Forward voltage	4011	t _p = 300 μs; 2% maximum duty cycle				
M, D, R, H						
1N5415, 1N5415US				0.6	1.6	V (pk)
1N5416, 1N5416US				0.6	1.7	V (pk)
1N5417, 1N5417US				0.6	1.8	V (pk)
1N5418, 1N5418US						
1N5419, 1N5419US						
1N5420, 1N5420US						
Reverse current, M, D, R, H	4016	DC method:	I _R			
1N5415, 1N5415US		V _R = 50 V dc			1.0	μA dc
1N5416, 1N5416US		V _R = 100 V dc			1.0	μA dc
1N5417, 1N5417US		V _R = 200 V dc			1.0	μA dc
1N5418, 1N5418US		V _R = 400 V dc			1.0	μA dc
1N5419, 1N5419US		V _R = 500 V dc			1.0	μA dc
1N5420, 1N5420US		V _R = 600 V dc			1.0	μA dc
<u>Subgroup 2</u>						
Total dose irradiation	1019					
Electrical measurements		I _F = 9 A dc pulsed	V _F			
Forward voltage	4011	t _p = 300 μs; 2% maximum duty cycle				
M, D, R, H						
1N5415, 1N5415US				0.6	1.6	V (pk)
1N5416, 1N5416US				0.6	1.7	V (pk)
1N5417, 1N5417US				0.6	1.8	V (pk)
1N5418, 1N5418US						
1N5419, 1N5419US						
1N5420, 1N5420US						
Reverse current M, D, R, H	4016	DC method:	I _R			
1N5415, 1N5415US		V _R = 50 V dc			1.0	μA dc
1N5416, 1N5416US		V _R = 100 V dc			1.0	μA dc
1N5417, 1N5417US		V _R = 200 V dc			1.0	μA dc
1N5418, 1N5418US		V _R = 400 V dc			1.0	μA dc
1N5419, 1N5419US		V _R = 500 V dc			1.0	μA dc
1N5420, 1N5420US		V _R = 600 V dc			1.0	μA dc

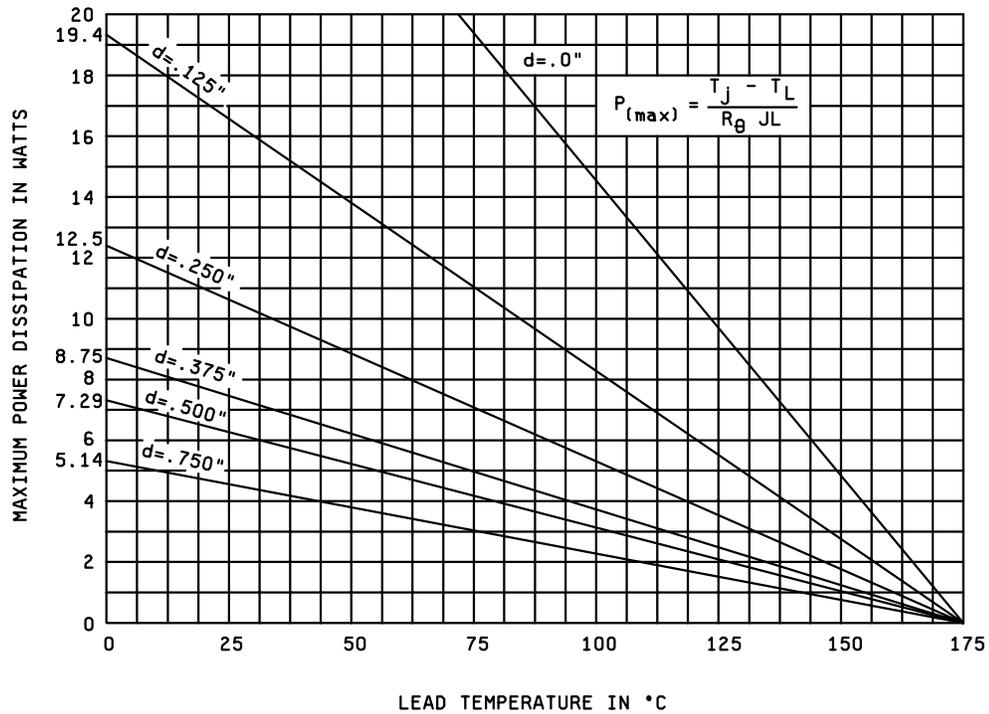
^{1/} For sampling plan, see MIL-PRF-19500.

MIL-PRF-19500/411H

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

Inspection	MIL-STD-750		Sampling plan <u>1/</u>
	Method	Conditions	
<u>Subgroup 1</u>			
Temperature cycling	1051	500 cycles; condition C	5
Electrical measurement		See table I, group A, subgroup 2	
<u>Subgroup 2</u>			
Steady-state dc blocking life	1038	1,000 hours, condition A.	5
Electrical measurements		See table I, group A, subgroup 2	
<u>Subgroup 3</u>			
Not applicable			
<u>Subgroup 4</u>			
Thermal resistance	3101 or 4081	See 4.5.5	10 devices c = 0
<u>Subgroup 5</u>			
Barometric pressure	1001	Pressure = 8.0 mm	10 devices c = 0

1/ For sampling plans not specified, see MIL-PRF-19500.



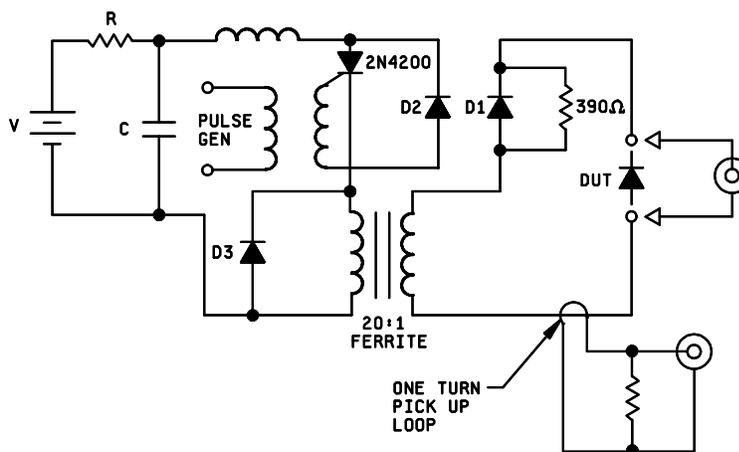
Maximum lead temperature in °C (T_L) at point "L" from body (for maximum operating junction temperature with equal two-lead conditions).

d	R _{θJL}
Inches	°C/W
.000 (.00)	4
.125 (3.18)	9
.250 (6.35)	14
.375 (9.53)	20
.500 (12.70)	24
.750 (19.05)	34

NOTES:

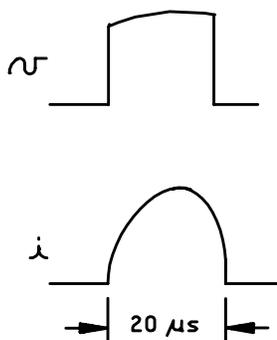
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 4. Maximum power in watts vs lead temperature.



NOTES:

- L = 13T H22 on 1" diameter form (air core).
- C ~ 1 to 10 μ fd to give 20 μ s pulse width.
- V - Adjustable to 200 volts for power desired in DUT.
- D1 - 3 kV; 600 Ma (1N3647 or equivalent).
- D2, D3 - 600 V; 3A (1N5552 or equivalent).
- * Values not stated are determined at the time of test.



TYPICAL WAVEFORMS

FIGURE 5. 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 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 2.2.1).
- b. Lead finish (see 3.4.1).
- c. Type designation and product assurance level.
- d. Packaging requirements (see 5.1).

6.3 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.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or 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
NASA - NA
DLA - CC

Preparing activity:

DLA - CC
(Project 5961-2154)

Review activities:

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

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL		
<u>INSTRUCTIONS</u>		
<p>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.</p> <p>2. The submitter of this form must complete blocks 4, 5, 6, and 7.</p> <p>3. The preparing activity must provide a reply within 30 days from receipt of the form.</p> <p>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.</p>		
I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/411H	2. DOCUMENT DATE
3. DOCUMENT TITLE Semiconductor Device, Diode, Silicon, Power Rectifier, Fast Recovery Types 1N5415 through 1N5420, 1N5415US through 1N5420US, JAN, JANTX and JANTXV, JANS, JANTXVM, JANTXVD, JANTXVR, JANTXVH, JANSM, JANSJ, JANSR, AND JANSJ		
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@dsc.dla.mil	
c. ADDRESS Defense Supply Center Columbus ATTN: DSCC-VAT 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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