The documentation and process conversion measures necessary to comply with this revision shall be completed by 23 October 1999.

INCH-POUND

MIL-PRF-19500/516D
23 July 1999
SUPERSEDING
MIL-S-19500/516C
20 January 1995

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE SILICON, BIPOLAR TRANSIENT VOLTAGE SUPPRESSOR, TYPES 1N6102 THROUGH 1N6137, 1N6102A THROUGH 1N6137A, 1N6138 THROUGH 1N6173, 1N6138A THROUGH 1N6173A, 1N6102US THROUGH 1N6137US, 1N6102AUS THROUGH 1N6137AUS, 1N6138US THROUGH 1N6173US, 1N6138AUS THROUGH 1N6173AUS, JAN, JANTX, JANTXV, JANHC, JANKC, AND JANS

This specification is approved for use within US Army Laboratory Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for 500 watt and 1,500 watt peak pulse power transient voltage suppressor diodes. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for die. The suffix "A" denotes a five percent voltage tolerance.

1.2 Physical dimensions. See figure 1, figure 2 (surface mount), and figures 3 and 4 (die) herein.

1.3 Maximum ratings. Maximum ratings are as shown in columns 4, 6, and 7 of table II herein and as follows:

P_R = 2 W (for 500 W peak pulse power devices) and 3 W (for 1,500 W peak pulse power devices) at T_A = +25°C (see figure 5 for derating).

P_R = 3 W (for 500 W peak pulse power devices) and 5 W (for 1,500 W peak pulse power devices) at T_L = +75°C for L = 0.375 inch (9.53 mm) (see figure 6).

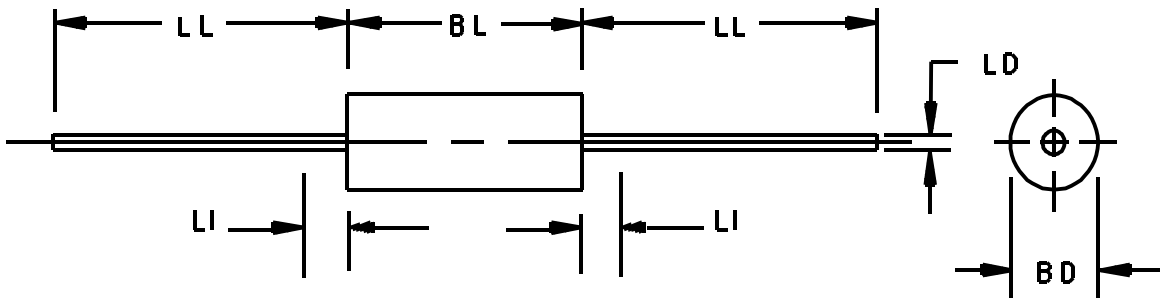
P_{PR} = 500 W (1N6102 through 1N6137 (including A and US suffix versions)) and 1,500 W (1N6138 through 1N6173 (including A and US suffix versions)) at t_p = 1 ms (see figure 7).

$-55°C \le T_{op} \le +175°C$, $-55°C \le T_{STG} \le +175°C$ (ambient temperatures).

1.4 Primary electrical characteristics. Primary electrical characteristics are as shown in columns 2 and 4 of table II herein.

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 St., Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

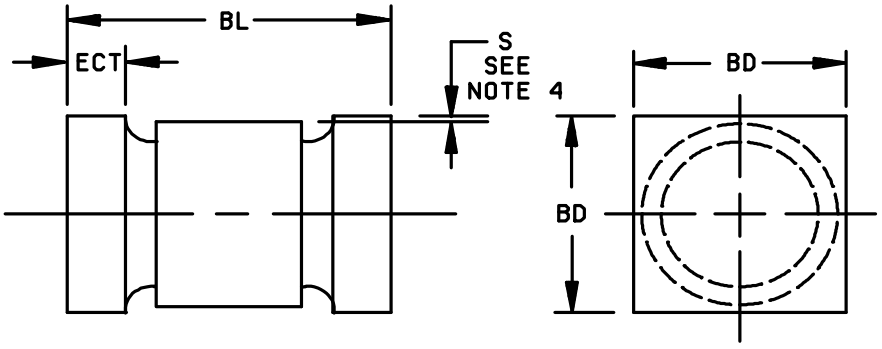
AMSC N/A FSC 5961



Ltr.	Dimensions								Notes
	1N6102 through 1N6137 1N6102A through 1N6137A				1N6138 through 1N6173 1N6138A through 1N 6173A				
	Inches		Millimeters		Inches		Millimeters		
	Min	Max	Min	Max	Min	Max	Min	Max	
BD	.085	.140	2.16	3.56	.135	.185	3.43	4.70	3
BL	.140	.185	3.56	4.70	.140	.195	3.56	4.95	
LD	.026	.033	0.66	0.84	.036	.042	0.92	1.07	
LL	1.00	1.30	25.4	33.02	1.00	1.30	25.4	33.02	
L1		.030		0.76		.030		0.76	4

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 L_1 lead diameter uncontrolled in this area.
5. Symbol for internal construction of a bipolar transient suppressor.

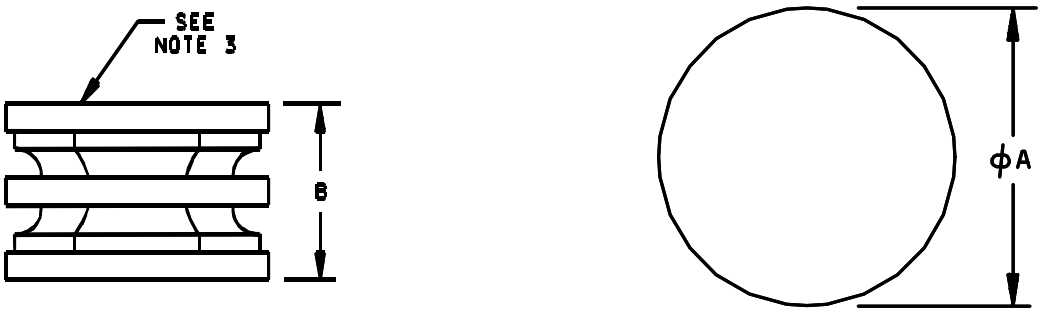
FIGURE 1. Semiconductor device, diode, types 1N6102 through 1N6173 and 1N6102A through 1N6173A.



Ltr.	Dimensions								Notes
	D-5B				D-5DC				
	1N6102US through 1N6137US, 1N6102AUS through 1N6137AUS				1N6138US through 1N6173US 1N6138AUS through 1N6173AUS				
	Inches		Millimeters		Inches		Millimeters		
	Min	Max	Min	Max	Min	Max	Min	Max	
BD	.137	.148	3.48	3.76	.183	.202	4.65	5.13	
BL	.200	.225	5.08	5.72	.205	.245	5.21	6.22	
ECT	.019	.028	0.48	0.71	.019	.028	0.48	0.71	
S	.003		0.80		.003		0.80		

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.
4 Minimum clearance of glass body to mounting surface on all orientations.

FIGURE 2. Semiconductor device, diode 1N6102US through 1N6173US, 1N6102AUS through 1N6173AUS.

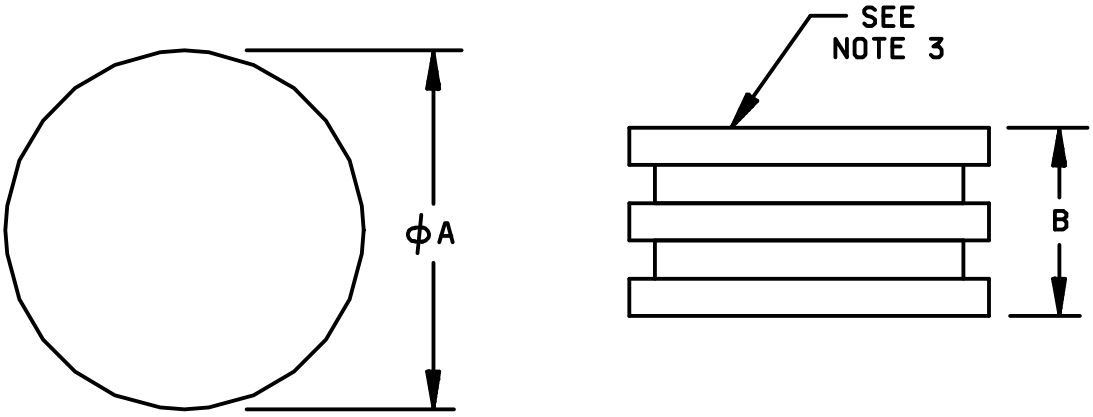


A - version

Dimensions								
Ltr	1N6103 through 1N6137 1N6103A through 1N6137A				1N6139 through 1N6173 1N6139A through 1N6173A			
	Inches		Millimeters		Inches	Millimeters	Inches	Millimeters
	Min	Max	Min	Max	Min	Max	Min	Max
ϕA	.087	.093	2.21	2.36	.124	.130	3.15	3.30
B	.030	.040	0.76	1.02	.030	.040	0.76	1.02

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are for general information only.
3. Silver plate 250 microinches nominal on all surfaces of three discs.

FIGURE 3. Physical dimensions, JANHC and JANKC die (A-version), 1N6102 through 1N6173, 1N6102A through 1N6173A.



B - version

Dimensions								
Ltr	1N6103 through 1N6137 1N6103A through 1N6137A				1N6139 through 1N6173 1N6139A through 1N6173A			
	Inches		Millimeters		Inches	Millimeters	Inches	Millimeters
	Min	Max	Min	Max	Min	Max	Min	Max
ϕA	.087	.093	2.21	2.36	.124	.130	3.15	3.30
B	.110	.120	2.79	3.05	.110	.120	2.79	3.05

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are for general information only.
3. Silver thickness 120 microinches nominal on all discs.

FIGURE 4. Physical dimensions, JANHC and JANKC die (B-version), 1N6102 through 1N6173, 1N6102A through 1N6173A.

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

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, Building 4D (NPM-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 (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 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

V_C (max) ..... Maximum clamping voltage. The maximum peak voltage appearing across the device when subjected to the peak pulse current I_P.

$I_{(BR)}$ ..... Reverse breakdown current at the specified condition.

P_{PR} ..... Reverse peak pulse power.

$\alpha V_{(BR)}$ ..... Temperature coefficient of $V_{(BR)}$.

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

3.3.1 Metallurgical bond construction. Metallurgically bonded construction is required. The silicon die shall be metallurgically bonded to both terminal pins. The silicon die attach material shall have a solidus point $\geq$ +350°C (i.e., must exhibit some mechanical strength up to +350°C).

3.3.2 Lead finish. Lead finish shall be solderable as defined in MIL-PRF-19500, MIL-STD-750, and as specified herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

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

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

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

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in tables I and II.

3.7 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).

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. A separate qualification shall be required for the 500-watt and 1,500-watt peak pulse power device, respectively.

4.2.1 JANHC and JANKC die. JANHC and JANKC die shall be qualified in accordance with MIL-PRF-19500.

4.3 Screening (JANS, JANTX, and JANTXV levels only). 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	JANTX and JANTXV levels
9	Not applicable	Not applicable
11	Not applicable	Not applicable
12	See 4.5.1	See 4.5.1
13	Interim electrical, delta, and group A, subgroup 2, electrical parameters not applicable for this screen (performed in screen 12).	Interim electrical, delta, and group A, subgroup 2, electrical parameters not applicable for this screen (performed in screen 12).

4.3.1 Screening (JANHC and JANKC die). Screening of JANHC and JANKC die shall be in accordance with MIL-PRF-19500. As a minimum, die shall be 100-percent probed in accordance with group A, subgroup 2.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein. A separate quality conformance inspection shall be required for the 500-watt and 1,500-watt peak pulse power devices, respectively.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (end-points) and delta requirements shall be performed twice (once in each direction), in accordance with group A, subgroup 2.

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

Subgroup	Method	Condition
B4		Not applicable.
B5	1027	T_A = +100°C minimum (see 4.5.2 and 4.5.3)

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

Subgroup	Method	Condition
B3	1027	(See 4.5.1).
B5		Not applicable.
B6		Delta limits: ΔI_{R1} ≤ 100 percent of initial reading or 20 percent of column 5, whichever is greater; $\Delta V_{(BR)}$ ≤ 5 percent of initial value.

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, and as follows. Electrical measurements (end-points) shall be performed twice (once in each direction), in accordance with group A, subgroup 2.

Subgroup	Method	Condition
C2	2036	lead tension: Test condition A, weight = 5 pounds, t = 15 ± 3 ≤. Lead fatigue: Test condition E, weight = 2 pounds (Not applicable to "US" suffix devices).
C6	1026	1 ms pulse only (see 4.5.1 and 4.5.3).
C7	4071	$I_{(BR)}$ = column 3 of table II, T_1 = +25°C ± 3°C, T_2 = T_1 +100°C; sampling plan shall be 45 devices, c = 0; $\alpha V_{(BR)}$ = column 8 of table II.

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

4.5.1 Power burn-in and steady-state operation life test conditions. For the purposes of this test, the direction in which the device is first pulsed shall be considered polarity A and the reverse direction polarity B. The test conditions and order of events shall be as follows:

a. Pulse in accordance with 4.5.3, in polarity A 5 times (screening and group B) and 50 times (group C) at T_A = +25°C.

b. Pulse in accordance with 4.5.3, in polarity B 5 times (screening and group B) and 50 times (group C) at T_A = +25°C.

c. Read and record I_{R1} and $V_{(BR)1}$ in polarities A and B at T_A = +25°C, remove defective devices and record number of failures.

d. Apply the working peak reverse voltage (V_{RWM}) (column 4 of table II) in polarity A at T_A = +125°C as follows:

   (1) 48 hours (JANTX and JANTXV) and 120 hours (JANS) for the screening test.

   (2) 170 hours (JAN, JANTX, and JANTXV) for group B steady-state operation life test.

   (3) 500 hours for group C steady-state operation life test.

e. Read I_{R1} in polarity A at T_A = +25°C. Devices with ΔI_{R1} > 50 percent (100 percent for steady-state operation life) of the initial reading or 20 percent of column 5, table II, whichever is greater, shall be considered defective. Remove defective devices and record the number of failures.

f. Apply the working peak pulse reverse voltage (V_{RWM}) (column 4 of table II in polarity B at T_A = +125°C as follows:

   (1) 48 hours (JANTX and JANTXV) and 120 hours (JANS) for the screening test.

   (2) 170 hours (JAN, JANTX, and JANTXV) for group B steady-state operation life test.

   (3) 500 hours for group C steady-state operation life test.

g. Read I_{R1} in polarity B at T_A = +25°C. Devices with ΔI_{R1} > 50 percent (100 percent for steady-state operation life) of the initial reading or 20 percent of column 5, table II, whichever is greater, shall be considered defective. Remove defective devices and record the number of failures.

4.5.1 Power burn-in and steady-state operation life test conditions - continued.

h. Read $V_{(BR)1}$ in polarities A and B at T_A = +25°C. Devices with ΔV_{BR1} > ±2 percent (±5 percent for steady-state operation life) of the initial reading shall be considered defective. Remove defective devices and record the number of failures.

i. Read I_{R1} in polarity A at T_A = +25°C, remove defective devices and record the number of failures.

4.5.1.1 Group C steady-state operation life test (alternate procedure). When the group B 340-hour life test is continued on test to 1,000 hours to satisfy the group C life test requirements, the test shall be performed as given in 4.5.1 with the following exceptions:

a. 4.5.1 steps a and b shall be moved and performed following step g.

b. 4.5.1 steps e and g shall be repeated after steps a and b are performed and before step h is completed (step i may be omitted when this procedure is used).

4.5.2 Accelerated steady-state operation life. This test shall be conducted with the devices subjected to the breakdown current specified in column 3 of table II in opposite polarities for 48 +8, -4 hours in each polarity. At the beginning of the test and at the end of each time period, the devices shall be temperature stabilized at T_A = +25°C and subjected to pulse conditions at the rate of one pulse per minute (max) for 10 pulses each in accordance with 4.5.3 as specified.

4.5.3 Maximum peak pulse current (I_P). The peak pulse currents specified in column 7 of table II shall be applied simultaneously maintaining a bias voltage, not less than the applicable voltage in column 4 of table II, in the same polarity as the peak pulse current. The peak pulse current shall be applied with a current versus time waveform (1 pulse per minute maximum) such that the pulse current shall reach 100 percent of I_P at $t \leq 10$ µs and decay to 50 percent of I_P at $t \geq 1$ ms for t_p = 1 ms (see figure 8).

NOTE: Tolerance on time (t) shall be -0 +10 percent.

4.5.4 Clamping voltage. The peak pulse clamping voltage shall be measured across the diode in a 1 ms time interval. The response detector shall demonstrate equipment accuracy of ±3 percent.

4.5.5 Lot accumulation. Lot accumulation period shall be six months in lieu of six weeks

TABLE I. Group A inspection .

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2 2/						
Reverse current leakage	4016	DC method, $V_R = V_{RWM}$ (column 4 of table II herein.)	I_{R1}		Column 5 of table II	µA dc
Breakdown voltage	4022	$t_p \leq 300$ ms, duty cycle ≤ 2 percent $I_{(BR)}$ = column 3 of table II	$V_{(BR)1}$	Column 2 of table II		V dc
Subgroup 3 2/						
High temperature operation		T_A = +150°C				
Reverse current leakage	4016	DC method, $V_R = V_{RWM}$ (column 4 of table II herein.)	I_{R2}		Column 9 of table II	µA dc
Subgroup 4 2/						
Clamping voltage maximum (pulsed)		t_p = 1 ms (see 4.5.3 and 4.5.4), I_p = column 7 of table II.	$V_{C(MAX)}$		Column 6 of table II	V (pk)
Subgroups 5 and 6						
Not applicable						

1/ For sampling plan, see MIL-PRF-19500.
2/ All electrical testing shall be performed twice, once in each direction.

TABLE II. Electrical characteristics for 500 W and 1,500 W series diodes (limits apply in both directions).

Column 1		Column 2	Column 3	Column 4	Column 5		Column 6	Column 7		Column 8	Column 9	
Series type		Breakdown voltage $V_{(BR)1}$ at $I_{(BR)}$ 1/	Test current $I_{(BR)}$ 1/	Working peak reverse voltage V_{RWM} 1/	Maximum reverse current I_{R1}		Maximum clamping voltage V_C (max) at I_p t_p = 1 ms 1/	Maximum peak pulse current I_P		Maximum temp. Coeff. of $V_{(BR)}$ $\alpha V_{(BR)}$ 1/	Maximum reverse current at T_A = +150°C I_{R2}	
500 W	1,500 W	Min V dc	mA dc	V dc	µA dc 2/	µA dc 3/	V (PK)	500 W 2/ A (PK)	1,500 W 3/ A (PK)	%/°C	500 W 2/ µA dc	1,500 W 3/ µA dc
1N6102	1N6138	6.12	175	5.2	100	500	11.0	45.4	136.4	.05	4,000	12,000
1N6102A	1N6138A	6.46	175	5.2	100	500	10.5	47.6	142.8	.05	4,000	12,000
1N6103	1N6139	6.75	175	5.7	50	300	11.8	42.4	127.1	.06	750	3,000
1N6103A	1N6139A	7.13	175	5.7	50	300	11.2	44.6	133.9	.06	750	3,000
1N6104	1N6140	7.38	150	6.2	20	100	12.7	39.4	118.1	.06	500	2,000
1N6104A	1N6140A	7.79	150	6.2	20	100	12.1	41.3	124.0	.06	500	2,000
1N6105	1N6141	8.19	150	6.9	20	100	14.0	35.7	107.1	.06	300	1,200
1N6105A	1N6141A	8.65	150	6.9	20	100	13.4	37.3	111.9	.06	300	1,200
1N6106	1N6142	9.00	125	7.6	20	100	15.2	32.9	98.7	.07	200	800
1N6106A	1N6142A	9.50	125	7.6	20	100	14.5	34.5	103.4	.07	200	800
1N6107	1N6143	9.90	125	8.4	20	20	16.3	30.7	92.0	.07	200	800
1N6107A	1N6143A	10.45	125	8.4	20	20	15.6	32.0	96.2	.07	200	800
1N6108	1N6144	10.80	100	9.1	20	20	17.7	28.2	84.7	.07	150	600
1N6108A	1N6144A	11.40	100	9.1	20	20	16.9	29.6	88.8	.07	150	600
1N6109	1N6145	11.70	100	9.9	20	20	19.0	26.3	78.9	.08	150	600
1N6109A	1N6145A	12.35	100	9.9	20	20	18.2	27.5	82.4	.08	150	600
1N6110	1N6146	13.50	75	11.4	20	20	21.9	22.8	68.5	.08	100	400
1N6110A	1N6146A	14.25	75	11.4	20	20	21.0	23.8	71.4	.08	100	400
1N6111	1N6147	14.40	75	12.2	20	20	23.4	21.4	64.1	.08	100	400
1N6111A	1N6147A	15.20	75	12.2	20	20	22.3	22.4	67.3	.08	100	400
1N6112	1N6148	16.20	65	13.7	1	10	26.3	19.0	57.0	.085	100	400
1N6112A	1N6148A	17.10	65	13.7	1	10	25.1	19.9	59.8	.085	100	400
1N6113	1N6149	18.00	65	15.2	1	5	29.0	17.2	51.7	.085	100	400
1N6113A	1N6149A	19.00	65	15.2	1	5	27.7	18.0	54.2	.085	100	400
1N6114	1N6150	19.8	50	16.7	1	5	31.9	15.7	47.0	.085	100	400
1N6114A	1N6150A	20.9	50	16.7	1	5	30.5	16.4	49.2	.085	100	400
1N6115	1N6151	21.6	50	18.2	1	5	34.8	14.4	43.1	.09	100	400
1N6115A	1N6151A	22.8	50	18.2	1	5	33.3	15.0	45.0	.09	100	400
1N6116	1N6152	24.3	50	20.6	1	5	39.2	12.8	38.3	.09	100	400
1N6116A	1N6152A	25.7	50	20.6	1	5	37.4	13.4	40.1	.09	100	400

See footnotes at end of table.

TABLE II. Electrical characteristics for 500 W and 1,500 W series diodes (limits apply in both directions).

Column 1		Column 2	Column 3	Column 4	Column 5		Column 6	Column 7		Column 8	Column 9	
Series type		Breakdown voltage $V_{(BR)1}$ at $I_{(BR)}$ 1/	Test current $I_{(BR)}$ 1/	Working peak reverse voltage V_{RWM} 1/	Maximum reverse current I_{R1}		Maximum clamping voltage V_C (max) at I_p t_p = 1 ms 1/	Maximum peak pulse current I_P		Maximum temp. Coeff. of $V_{(BR)}$ $\alpha V_{(BR)}$ 1/	Maximum reverse current at T_A = +150°C I_{R2}	
500 W	1,500 W	Min V dc	mA dc	V dc	µA dc 2/	µA dc 3/	V (PK)	500 W 2/ A (PK)	1,500 W 3/ A (PK)	%/°C	500 W 2/ µA dc	1,500 W 3/ µA dc
1N6117	1N6153	27.0	40	22.8	1	5	43.6	11.5	34.4	.09	100	400
1N6117A	1N6153A	28.5	40	22.8	1	5	41.6	12.0	36.0	.09	100	400
1N6118	1N6154	29.7	40	25.1	1	5	47.9	10.4	31.3	.095	100	400
1N6118A	1N6154A	31.4	40	25.1	1	5	45.7	10.9	32.8	.095	100	400
1N6119	1N6155	32.4	30	27.4	1	5	52.3	9.6	28.7	.095	100	400
1N6119A	1N6155A	34.2	30	27.4	1	5	49.9	10.0	30.1	.095	100	400
1N6120	1N6156	35.1	30	29.7	1	5	56.2	8.9	26.7	.095	100	400
1N6120A	1N6156A	37.1	30	29.7	1	5	53.6	9.3	28.0	.095	100	400
1N6121	1N6157	38.7	30	32.7	1	5	62.0	8.1	24.2	.095	100	400
1N6121A	1N6157A	40.9	30	32.7	1	5	59.1	8.5	25.4	.095	100	400
1N6122	1N6158	42.3	25	35.8	1	5	67.7	7.4	22.2	.095	100	400
1N6122A	1N6158A	44.7	25	35.8	1	5	64.6	7.7	23.2	.095	100	400
1N6123	1N6159	45.9	25	38.8	1	5	73.5	6.8	20.4	.095	100	400
1N6123A	1N6159A	48.5	25	38.8	1	5	70.1	7.1	21.4	.095	100	400
1N6124	1N6160	50.4	20	42.6	1	5	80.7	6.2	18.6	.095	100	400
1N6124A	1N6160A	53.2	20	42.6	1	5	77.0	6.5	19.5	.095	100	400
1N6125	1N6161	55.8	20	47.1	1	5	89.3	5.6	16.8	.100	100	400
1N6125A	1N6161A	58.9	20	47.1	1	5	85.3	5.9	17.6	.100	100	400
1N6126	1N6162	61.2	20	51.7	1	5	98.0	5.1	15.3	.100	100	400
1N6126A	1N6162A	64.6	20	51.7	1	5	97.1	5.1	15.4	.100	100	400
1N6127	1N6163	67.5	20	56.0	1	5	108.1	4.6	13.9	.100	100	400
1N6127A	1N6163A	71.3	20	56.0	1	5	103.1	4.8	14.5	.100	100	400
1N6128	1N6164	73.8	15	62.2	1	5	118.2	4.2	12.7	.100	100	400
1N6128A	1N6164A	77.9	15	62.2	1	5	112.8	4.4	13.3	.100	100	400
1N6129	1N6165	81.9	15	69.2	1	5	131.1	3.8	11.4	.100	100	400
1N6129A	1N6165A	86.5	15	69.2	1	5	125.1	4.0	12.0	.100	100	400
1N6130	1N6166	90.0	12	76.0	1	5	144.1	3.5	10.4	.100	100	400
1N6130A	1N6166A	95.0	12	76.0	1	5	137.6	3.6	10.9	.100	100	400
1N6131	1N6167	99.0	12	83.6	1	5	158.5	3.2	9.5	.100	100	400
1N6131A	1N6167A	104.5	12	83.6	1	5	151.3	3.3	9.9	.100	100	400

See footnotes at end of table.

TABLE II. Electrical characteristics for 500 W and 1,500 W series diodes (limits apply in both directions).

Column 1		Column 2	Column 3	Column 4	Column 5		Column 6	Column 7		Column 8	Column 9	
Series type		Breakdown voltage $V_{(BR)1}$ at $I_{(BR)}$ 1/	Test current $I_{(BR)}$ 1/	Working peak reverse voltage V_{RWM} 1/	Maximum reverse current I_{R1}		Maximum clamping voltage V_C (max) at I_p t_p = 1 ms 1/	Maximum peak pulse current I_P		Maximum temp. Coeff. of $V_{(BR)}$ $\alpha V_{(BR)}$ 1/	Maximum reverse current at T_A = +150°C I_{R2}	
500 W	1,500 W	Min V dc	mA dc	V dc	µA dc 2/	µA dc 3/	V (PK)	500 W 2/ A (PK)	1,500 W 3/ A (PK)	%/°C	500 W 2/ µA dc	1,500 W 3/ µA dc
1N6132	1N6168	108.0	10	91.2	1	5	172.9	2.9	8.7	.100	100	400
1N6132A	1N6168A	114.0	10	91.2	1	5	165.1	3.0	9.1	.100	100	400
1N6133	1N6169	117.0	10	98.8	1	5	187.3	2.7	8.0	.105	100	400
1N6133A	1N6169A	123.5	10	98.8	1	5	178.8	2.8	8.4	.105	100	400
1N6134	1N6170	135.0	8	114.0	1	5	216.2	2.3	6.9	.105	100	400
1N6134A	1N6170A	142.5	8	114.0	1	5	206.3	2.4	7.3	.105	100	400
1N6135	1N6171	144	8	121.6	1	5	228.8	2.2	6.6	.105	100	400
1N6135A	1N6171A	152	8	121.6	1	5	218.4	2.3	6.9	.105	100	400
1N6136	1N6172	162	5	136.8	1	5	257.4	1.9	5.8	.110	100	400
1N6136A	1N6172A	171	5	136.8	1	5	245.7	2.0	6.1	.110	100	400
1N6137	1N6173	180	5	152.0	1	5	286.0	1.7	5.2	.110	100	400
1N6137A	1N6173A	190	5	152.0	1	5	273.0	1.8	5.5	.110	100	400

1/ Applies to both 500 W and 1,500 W series.
2/ Applies to only 500 W series.
3/ Applies to only 1,500 W series.

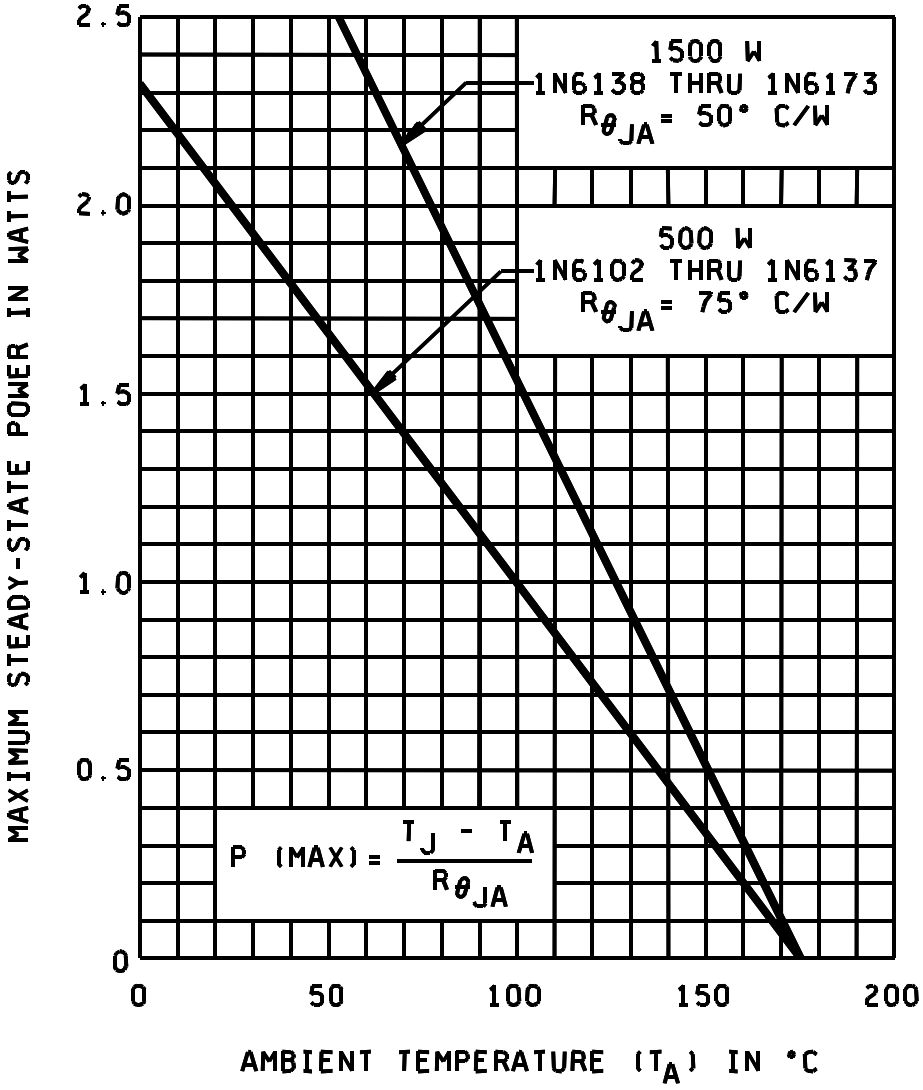
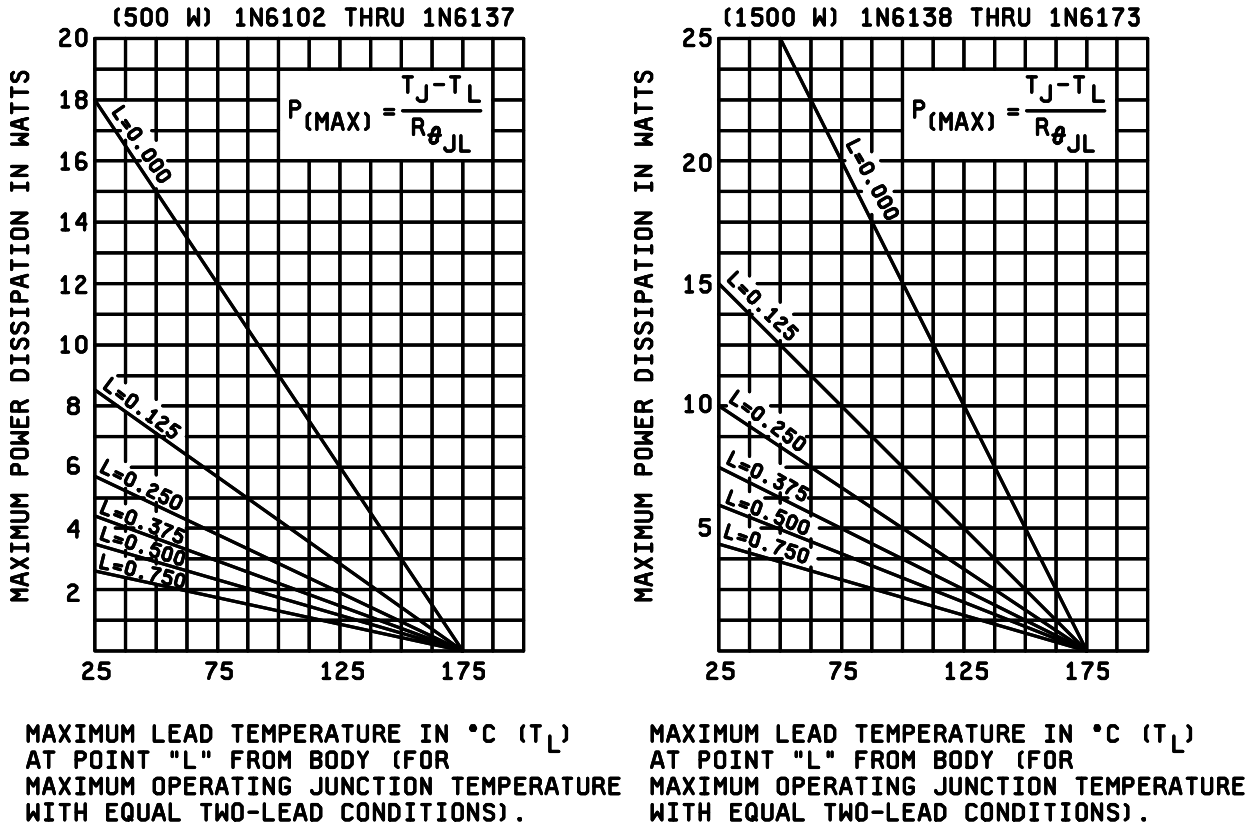


FIGURE 5. Steady-state derating curve for free-air mounting (not applicable to JANHC/JANKC die).



L		$R_{\Theta JL}$
Inches	mm	C/W
0.000	(0.00)	8.3
0.125	(3.17)	17.5
0.250	(6.35)	26.5
0.375	(9.53)	33.5
0.500	(12.70)	42.0
0.750	(19.05)	55.0

L		$R_{\Theta JL}$
Inches	mm	C/W
0.000	(0.00)	5
0.125	(3.17)	10
0.250	(6.35)	15
0.375	(9.53)	20
0.500	(12.70)	25
0.750	(19.05)	33

FIGURE 6. Maximum power versus lead temperature (not applicable to JANHC/JANKC die).

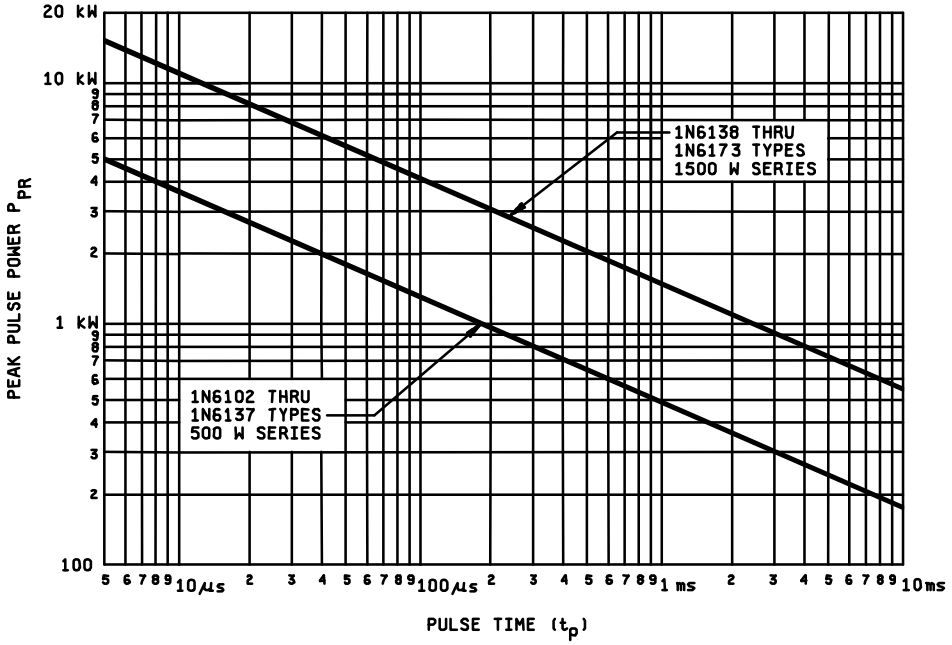


FIGURE 7. Peak pulse power versus pulse time.

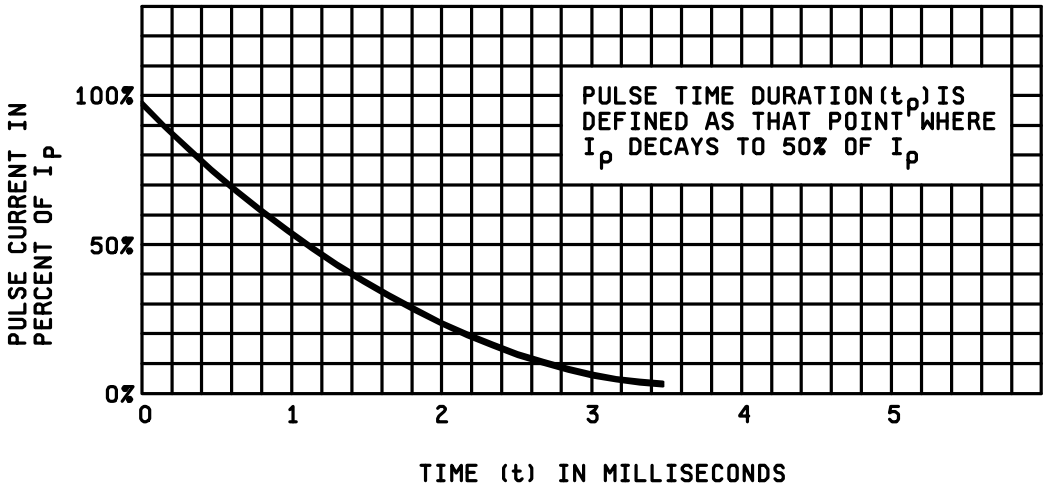
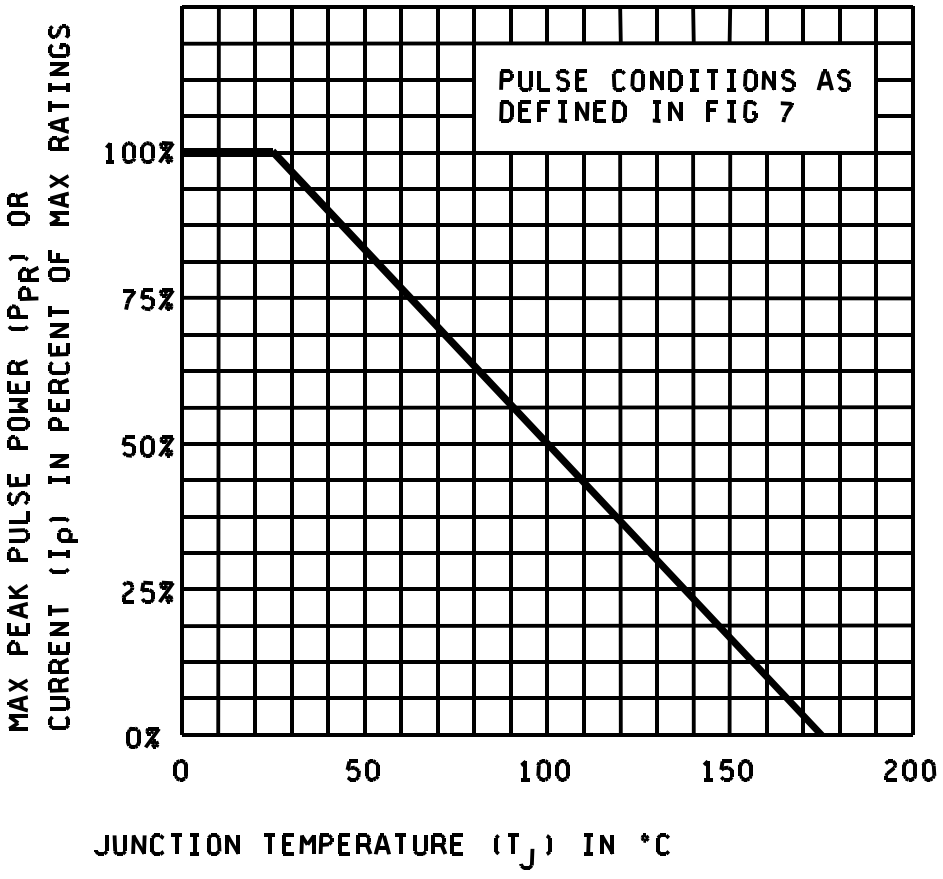


FIGURE 8. Pulse waveform.



The pulse derating curve of maximum peak pulse power versus junction temperature has been included for reference purposes only.

FIGURE 9. Pulse derating curve (not applicable to JANHC/JANKC die)

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 3.3.2).

c. For die acquisition, the JANC letter version should be specified (see figures 3 and 4).

d. Product assurance level and type designation.

e. Packaging requirements (see 5.1).

6.3 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA1N6102) will be identified on the QPL.

JANHC and JANKC ordering information 1/		
PIN	Manufacturer CAGE	
	14552	14099
	2/	2/
1N6102 through 1N6137	JANHCA1N6102 through JANHCA1N6137	JANHCB1N6102 through JANHCB1N6137
1N6138 through 1N6173	JANHCA1N6138 through JANHCA1N6173	JANHCB1N6138 through JANHCB1N6173

1/ Applies to "A" suffix versions also.
2/ For JANKC level, replace "JANHC" prefix with "JANKC"

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, DSCC-VQE, Columbus, OH 43216.

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 extent of the changes.

CONCLUDING MATERIAL

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

Preparing activity:
DLA - CC

(Project 5961-2175)

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-19500/516D	**2. DOCUMENT DATE** 99/07/23

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, DIODE SILICON, BIPOLAR TRANSIENT VOLTAGE SUPPRESSOR, TYPES 1N6102 THROUGH 1N6137, 1N6102A THROUGH 1N6137A, 1N6138 THROUGH 1N6173, 1N6138A THROUGH 1N6173A, 1N6102US THROUGH 1N6137US, 1N6102AUS THROUGH 1N6137AUS, 1N6138US THROUGH 1N6173US, 1N6138AUS THROUGH 1N6173AUS, JAN, JANTX, JANTXV, JANHC, JANKC, AND JANS

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: 614-692-0510 DSN: 850-0510 FAX: 614-692-6939 EMAIL: alan_barone@dscc.dla.mil
c. ADDRESS 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 Belvior, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888

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