

The documentation and process conversion measures necessary to comply with this revision shall be completed by 16 September 2000.

INCH-POUND

MIL-PRF-19500/635A  
16 June 2000  
SUPERSEDING  
MIL-PRF-19500/635  
16 October 1996

## PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, DIODE, SILICON, POWER RECTIFIER,  
ULTRAFAST, TYPES 1N6710 THROUGH 1N6716 AND 1N6710R THROUGH 1N6716R  
JANTX, JANTXV, AND JANS  
AND POWER RECTIFIER, STANDARD RECOVERY, TYPES 1N6710B THROUGH 1N6716B AND 1N6710BR  
THROUGH 1N6716BR, JANTX, JANTXV AND JANS

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, ultrafast power rectifier diodes (1N6710, R through 1N6716, R) and standard recovery diodes (1N6710B, BR through 1N6716B, BR). Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1.

1.3 Maximum ratings.

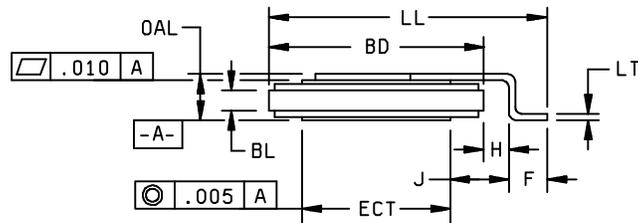
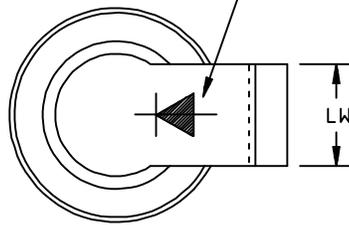
Types	V <sub>RWM</sub>	I <sub>O</sub> (1) T <sub>A</sub> = +25°C	t <sub>rr</sub>	I <sub>FSM</sub> t <sub>p</sub> = 8.3 ms, T <sub>A</sub> = +25°C	R <sub>θJC</sub>	T <sub>STG</sub> and T <sub>J</sub>	Case Type DO-217 (see fig.1)	Z <sub>θJX</sub>
	V <sub>dc</sub>	A <sub>dc</sub>	ns	A (pk)	°C/W	°C		.5
1N6710, R	100	50	40	375	0.65	-65 to +150	AA	.5
1N6711, R	200	50	40	375	0.65	-65 to +150	AA	.5
1N6712, R	400	50	40	325	0.65	-65 to +150	AA	.5
1N6713, R	600	50	60	300	1.0	-65 to +150	AB	.5
1N6714, R	800	50	70	300	1.0	-65 to +150	AB	.5
1N6715, R	1,000	50	80	200	1.0	-65 to +150	AB	.5
1N6716, R	1,200	50	80	200	1.0	-65 to +150	AB	.5
1N6710B, BR	100	50	2000	375	0.65	-65 to +150	AA	.5
1N6711B, BR	200	50	2000	375	0.65	-65 to +150	AA	.5
1N6712B, BR	400	50	2000	375	0.65	-65 to +150	AA	.5
1N6713B, BR	600	50	2000	375	1.0	-65 to +150	AB	.5
1N6714B, BR	800	50	2000	375	1.0	-65 to +150	AB	.5
1N6715B, BR	1,000	50	2000	300	1.0	-65 to +150	AB	.5
1N6716B, BR	1,200	50	2000	300	1.0	-65 to +150	AB	.5

- (1) Derate linearly 1N6710-1N6712 and 1N6710B-1N6712B from +120°C at 1.67 A/°C.  
Derate linearly 1N6713 and 1N6714 from +70°C at 0.625 A/°C.  
Derate linearly 1N6715 and 1N6716 from +25°C at 0.4 A/°C.  
Derate linearly 1N6713B through 1N6716B from +100°C at 1.0 A/°C .

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

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STANDARD POLARITY SHOWN STRAP TO ANODE.  
 REVERSE POLARITY STRAP TO CATHODE HAS  
 ARROW REVERSED.



Dimensions								
Ltr.	Case type AA				Case type AB			
	Inches		Millimeters		Inches		Millimeters	
BD	.315	.335	8.00	8.50	.315	.335	8.00	8.50
BL	.010	----	0.25	----	.060	----	1.52	----
ECT	.220	.230	5.59	5.84	.220	.230	5.59	5.84
F	.055	.075	1.40	1.91	.055	.075	1.40	1.91
H	.035	.055	0.89	1.40	.035	.055	0.89	1.40
J	.072	.102	1.83	2.60	.072	.102	1.83	2.60
LT	.008	.012	0.20	0.30	.008	.018	0.20	0.30
LL	.407	.447	10.34	11.35	.407	.447	10.34	11.35
LW	.140	.160	3.56	4.06	.140	.160	3.56	4.06
OAL	----	.090	----	2.28	----	.150	----	3.81

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension BL is minimum for isolation on ceramic only.

FIGURE 1. Dimensions and configuration for 1N6710 through 1N6716 (D0-217AA and AB).

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

#### SPECIFICATION

##### DEPARTMENT OF DEFENSE

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

#### STANDARD

##### DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Service (DAPS), 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, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

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

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).

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

3.4 Interface requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1 herein.

3.4.1 Diode construction. These devices shall be constructed utilizing double plug construction with eutectic bonding between both sides of the silicon die and terminal pins (see MIL-PRF-19500). Metallurgical bond shall be in accordance with the requirements of category II in MIL-PRF-19500. The diode body is ceramic. All seals are eutectic solder. Strap material is a copper alloy or copper sandwich. The strap connects to the anode on 1N6710, B through 1N6716, B and to the cathode on 1N6710R, BR through 1N6716R, BR.

3.4.2 Lead formation and finish. Unless otherwise specified, lead finish (bottom pad and strap foot) shall be solderable as in accordance with MIL-PRF-19500 and herein. Where a choice of lead finish or formation is desired, it shall be specified in the acquisition document (see 6.2).

3.4.3 Polarity. Polarity shall be marked with the appropriate diode symbol on the strap.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500 and herein. All marking may be omitted from the device except for the polarity marking. When present, part number may be abbreviated (ex: JS6713 for JANS1N6713). All marking which is omitted from the body of the device shall appear on the label of the initial container.

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

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

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

#### 4. VERIFICATION

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

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

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

4.2.1 Construction verification. Cross sectional photos from three devices shall be submitted in the qualification report.

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4.3 Screening. 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
3b	Cond. A, one pulse, $I_o = 0$ , $V_{RM}(wkg) = 0$ , if(surge) = see 1.3 herein	Cond. A, one pulse, $I_o = 0$ , $V_{RM}(wkg) = 0$ , if(surge)= see 1.3 herein
3c (1)	Thermal impedance (see 4.5.2)	Thermal impedance (see 4.5.2)
4	Not applicable	Not applicable
5	Not applicable	Not applicable
8	NOTE: Serialization insures traceability to final electricals only (performed after step 12)	Not applicable
9	Not applicable	Not applicable
10	Not applicable	Not applicable
11	$V_{F1}$ and $I_{R1}$	$V_{F1}$ and $I_{R1}$
12	MIL-STD-750, method 1038; test condition A; $t = 240$ hours $V_R = 80$ percent of rated $V_R$ . 1N6710, R to 1N6716, R: $T_A = +100^\circ\text{C}$ min. 1N6710B, BR to 1N6716B, BR: $T_A = +125^\circ\text{C}$ min.	MIL-STD-750, method 1038; test condition A; $t = 48$ hours, $V_R = 80$ percent of rated $V_R$ . 1N6710, R to 1N6716, R: $T_A = +100^\circ\text{C}$ min. 1N6710B, BR to 1N6716B, BR: $T_A = +125^\circ\text{C}$ min.
13	Subgroup 2 and 7 of table I herein; (2) $V_{F1}$ and $I_{R1}$ ; $\Delta V_{F1} = \pm 100$ mV (pk); $\Delta I_{R1} = \pm 1$ $\mu\text{A}$ dc (except $\pm 5$ $\mu\text{A}$ dc for 1N6713, R through 1N6716, R) or 100 percent from the initial value, whichever is greater.	Subgroup 2 and 7 of table I herein; (3) $V_{F1}$ and $I_{R1}$ ; $\Delta V_{F1} = \pm 100$ mV (pk); $\Delta I_{R1} = \pm 1$ $\mu\text{A}$ dc (except $\pm 5$ $\mu\text{A}$ dc for 1N6713, R through 1N6716, R) or 100 percent from the initial value, whichever is greater.
14	(4)	(4)
15		Not applicable

- (1) Thermal impedance shall be performed any time after screen 3.
- (2) Delta readings shall be performed within 16 hours after removal of applied voltage in HTRB.
- (3) Delta readings shall be performed within 24 hours after removal of applied voltage in HTRB.
- (4) Gross Leak in accordance with condition C or D is not required if Fine Leak in accordance with condition H can be performed down to atmospheric pressure

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.  $Z_{\theta JX}$  shall be in accordance with MIL-STD-750, method 3101. The following test conditions shall be used for  $Z_{\theta JX}$ , group A inspection:

- a.  $I_M$  measure current ..... 10 mA minimum
- b.  $I_H$  forward heating current ..... 30 A minimum
- c.  $t_H$  heating time ..... 10 ms minimum
- d.  $t_D$  measurement delay time ..... 100  $\mu$ s maximum

The maximum limit for  $Z_{\theta JX}$ , under these test conditions are  $Z_{\theta JX}(\text{max}) = .5^\circ\text{C/W}$ .

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in tables VIa (JANS) and VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and paragraphs 4.4.2.1 and 4.4.2.2 herein. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2, forward voltage test ( $V_{F1}$ ) and reverse leakage test ( $I_{R1}$ ) herein. Delta measurements shall be in accordance with table II herein.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	4066	$i_f(\text{surge}) = \text{rated}$ (see 1.3), $I_O = 0$ , $V_{RWM} = 0$ ; 10 surges of 8.3 ms each at 1 minute intervals. Condition A, $T_A = +25^\circ\text{C}$ .
B4	1037	$\Delta T_C = +85^\circ\text{C}$ , $I_F$ or $I_O = 2$ A minimum for 2,000 cycles.
B5	1027	$I_F = 1$ A dc minimum, adjust $T_A$ or $I_F$ to achieve $T_J = +175^\circ\text{C}$ , $+0^\circ\text{C}$ , $-35^\circ\text{C}$ , $t = 240$ hours min; (heatsinking allowed).
B6	3101	$I_H = 30$ A min., $I_M = 10$ mA, $t_H = \text{thermal equilibrium}$ , $t_{MD} = 100 \mu\text{sec}$ .

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>
B2	4066	$i_f(\text{surge}) = \text{rated}$ (see 1.3), $I_O = V_{RWM} = 0$ ; 10 surges of 8.3 ms each at 1 minute intervals. Condition A, $T_A = +25^\circ\text{C}$ .
B3	1037	$\Delta T_C = +85^\circ\text{C}$ minimum, $I_F$ or $I_O = 2$ A minimum for 2,000 cycles.
B5	3101	$I_H = 30$ A, $I_M = 10$ mA, $t_H = \text{thermal equilibrium}$ ; $t_{MD} = 100 \mu\text{sec}$ .

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4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2, forward voltage test( $V_{F1}$ ) and reverse leakage test ( $I_{R1}$ ) herein. Delta measurements shall be in accordance with table II herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C3	2016, 2056, 2006	Not applicable
C5	3101	$I_H = 30 \text{ A}$ , $I_M = 10 \text{ mA}$ , $t_H = \text{thermal equilibrium}$ ; $t_{MD} = 100 \text{ } \mu\text{sec}$ .
C6	1037	$\Delta T_C = +85^\circ\text{C}$ , $I_F$ or $I_O = 2 \text{ A}$ minimum for 6,000 cycles.
C7	1018	Not applicable.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IX of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2, forward voltage test( $V_{F1}$ ) and reverse leakage test ( $I_{R1}$ ) herein. Delta measurements shall be in accordance with table II herein.

4.4.4.1 Group E inspection, table IX of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>	<u>Sampling plan</u>
E1	1051	Condition C, 500 cycles.	22 devices, c = 0
E2	1038	Condition A, t = 1,000 hours $V_R = 80 \text{ percent } V_{\text{rated}}$ , 1N6710, R to 1N6716, R: $T_A = +100^\circ\text{C min}$ . 1N6710B, BR to 1N6716B, BR: $T_A = +125^\circ\text{C min}$ .	22 devices, c = 0
E3	2101, 2102	Not applicable	
E4	3101	$T_A = +25^\circ\text{C}$ ; $R_{\theta JC} = \text{rated}$ $R_{\theta JC}$ (see 1.3).	5 devices, c = 0
E5	1001	Not applicable	
E6	1020	Not applicable	
E7	2103	Not applicable	

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

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in 4.3.2.1 of MIL-STD-750.

4.5.2 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 limit for  $Z_{\theta JX}$  in screening (table IV of MIL-PRF-19500) shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X, R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for engineering evaluation and disposition.

4.5.2.1 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.

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TABLE I. Group A inspection.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Thermal impedance	3101	See 4.4.1	$Z_{\theta JX}$		.5	°C/W
Breakdown voltage	4022	$I_R = 500 \mu A$ dc	$V_{BR}$			
1N6710, 1N6710R					90	V
1N6710B, 1N6710BR					90	V
1N6711, 1N6711R					180	V
1N6711B, 1N6711BR					180	V
1N6712, 1N6712R					360	V
1N6712B, 1N6712BR					360	V
1N6713, 1N6713R					540	V
1N6713B, 1N6713BR					540	V
1N6714, 1N6714R					720	V
1N6714B, 1N6714BR					720	V
1N6715, 1N6715R					900	V
1N6715B, 1N6715BR					900	V
1N6716, 1N6716R					1080	V
1N6716B, 1N6716BR					1080	V
Forward voltage	4011	$I_F = 10 A$ (pk); pulsed (see 4.5.1)	$V_{F1}$			
1N6710, 1N6710R					.890	V
1N6710B, 1N6710BR					.875	V
1N6711, 1N6711R					.890	V
1N6711B, 1N6711BR					.875	V
1N6712, 1N6712R					.950	V
1N6712B, 1N6712BR					.900	V
1N6713, 1N6713R					1.30	V
1N6713B, 1N6713BR					.925	V
1N6714, 1N6714R					1.30	V
1N6714B, 1N6714BR					.925	V
1N6715, 1N6715R					1.70	V
1N6715B, 1N6715BR					.950	V
1N6716, 1N6716R					1.70	V
1N6716B, 1N6716BR					.950	V

See footnotes at end of table.

TABLE I. Group A inspection.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2 - continued</u>						
Forward voltage 1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 30$ A (pk); pulsed (see 4.5.1)	$V_{F2}$			
				1.00		V
				.940		V
				1.00		V
				.940		V
				1.15		V
				.950		V
				1.50		V
				1.05		V
				1.50		V
				1.05		V
				2.20		V
				1.10		V
				2.20		V
				1.10		V
Forward voltage 1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 50$ A (pk); pulsed (see 4.5.1)	$V_{F3}$			
				1.10		V
				.975		V
				1.10		V
				.975		V
				1.25		V
				1.025		V
				1.65		V
				1.10		V
				1.65		V
				1.10		V
				2.50		V
				1.175		V
				2.50		V
				1.175		V
Reverse current leakage 1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4016	DC method; $V_R =$ rated $V_R$ (see 1.3)	$I_{R1}$			
				10		$\mu$ A
				10		$\mu$ A
				10		$\mu$ A
				10		$\mu$ A
				10		$\mu$ A
				10		$\mu$ A
				50		$\mu$ A
				10		$\mu$ A
				50		$\mu$ A
				10		$\mu$ A
				50		$\mu$ A
				10		$\mu$ A
				50		$\mu$ A
				10		$\mu$ A

See footnotes at end of table.

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TABLE I. Group A inspection.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 3</u>						
Reverse current leakage  1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4016	DC method; $V_R = \text{rated } V_R$ (see 1.3), $T_A = +125^\circ\text{C}$	$I_{R2}$			
					1	mA
					0.3	mA
					1	mA
					0.3	mA
					1	mA
					0.3	mA
					5	mA
					0.5	mA
					5	mA
					0.5	mA
					5	mA
					0.5	mA
					5	mA
					0.5	mA
Forward voltage  1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 10 \text{ A (pk)}$ ; pulsed (see 4.5.1) $T_A = +125^\circ\text{C}$	$V_{F4}$			
					.790	V
					.775	V
					.790	V
					.775	V
					.825	V
					.800	V
					1.20	V
					.850	V
					1.20	V
					.850	V
					1.65	V
					.900	V
					1.65	V
					.900	V
Forward voltage  1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 50 \text{ A (pk)}$ ; pulsed (see 4.5.1) $T_A = +125^\circ\text{C}$	$V_{F5}$			
					1.05	V
					.875	V
					1.05	V
					.875	V
					1.20	V
					.975	V
					1.65	V
					1.03	V
					1.65	V
					1.05	V
					2.75	V
					1.10	V
					2.75	V
					1.10	V

See footnotes at end of table.

MIL-PRF-19500/635A

TABLE I. Group A inspection.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 3 - continued</u>						
Forward voltage 1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 10 \text{ A (pk); pulsed (see 4.5.1) } T_A = -55^\circ\text{C}$	$V_{F5}$		1.00 1.00 1.00 1.00 1.05 1.00 1.30 1.03 1.30 1.03 1.70 1.05 1.70 1.05	V V V V V V V V V V V V V V V
Forward voltage  1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4011	$I_F = 50 \text{ A (pk); pulsed (see 4.5.1) } T_A = -55^\circ\text{C}$	$V_{F5}$		1.20 1.10 1.20 1.10 1.35 1.15 1.65 1.20 1.65 1.20 2.55 1.30 2.55 1.30	V V V V V V V V V V V V V V
<u>Subgroup 4</u>						
Reverse recovery time  1N6710, 1N6710R 1N6710B, 1N6710BR 1N6711, 1N6711R 1N6711B, 1N6711BR 1N6712, 1N6712R 1N6712B, 1N6712BR 1N6713, 1N6713R 1N6713B, 1N6713BR 1N6714, 1N6714R 1N6714B, 1N6714BR 1N6715, 1N6715R 1N6715B, 1N6715BR 1N6716, 1N6716R 1N6716B, 1N6716BR	4031	Condition B; $I_F = .5 \text{ A}$ , $I_{RM} = 1 \text{ A}$ $I_{R(REC)} = .25 \text{ A}$	$t_{rr}$		40 2000 40 2000 40 2000 60 2000 70 2000 80 2000 80 2000	ns ns ns ns ns ns ns ns ns ns ns ns ns ns

See footnotes at end of table.

TABLE I. Group A inspection.

Inspection <u>1/ 2/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4 - continued</u>						
Junction capacitance	4001	$V_R = 10 \text{ V dc, } f = 1 \text{ MHz, } V_{SIG} = 50 \text{ mV (p-p)}$ (max)	$C_J$			
1N6710, 1N6710R					500	pF
1N6710B, 1N6710BR					500	pF
1N6711, 1N6711R					500	pF
1N6711B, 1N6711BR					500	pF
1N6712, 1N6712R					350	pF
1N6712B, 1N6712BR					350	pF
1N6713, 1N6713R					350	pF
1N6713B, 1N6713BR					350	pF
1N6714, 1N6714R					350	pF
1N6714B, 1N6714BR					350	pF
1N6715, 1N6715R					250	pF
1N6715B, 1N6715BR					250	pF
1N6716, 1N6716R					250	pF
1N6716B, 1N6716BR					250	pF
<u>Subgroups 5 and 6</u>						
Not applicable						
<u>Subgroup 7</u>						
Scope display evaluation	4023 <u>2/</u>					

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

2/ The reverse breakdown characteristics shall be viewed on an oscilloscope with display calibration factors of 20 to 50  $\mu\text{A/division}$  and 20 to 200V/division. Reverse current over the knee shall be at least 100  $\mu\text{A}$ . Each device may exhibit a slightly rounded characteristic and any discontinuity or dynamic instability of the trace shall be cause for rejection.

TABLE II. Groups B, C, and E delta requirements. 1/, 2/, 3/, 4/, 5/

Step	Inspection <u>1/</u>	MIL-STD-750		Symbol	Limit		Unit
		Method	Conditions		Min	Max	
1.	Forward voltage	4011		$\Delta V_F$	$\pm 100$ mV		
2.	Reverse current leakage	4016		$\Delta I_{R1}$	1 $\mu$ A or 100 percent whichever is greater, except $\pm 5$ $\mu$ A dc for 1N6713, R through 1N6716, R)		

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

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control 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 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1).
- c. Lead finish (see 3.4.2).
- d. Type designation and product assurance level.
- e. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified 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, P.O. Box 3990, Columbus, OH 43216-5000.

6.4 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.

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

Preparing activity:  
DLA - CC  
  
(Project 5961-2124)

