

INCH-POUND

MIL-S-19500/254B  
21 March 2005  
SUPERSEDING  
MIL-S-19500/254A(EL)  
6 February 1968

\* PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON,  
TYPES 1N1147 AND 1N1149, JAN

Inactive for new design after 7 June 1999.

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

- \* The requirements for acquiring the product described herein shall consist of  
this specification sheet and MIL-PRF-19500.

1. SCOPE

- \* 1.1 Scope. This specification covers the performance requirements for silicon, semiconductor diodes for use particularly as high-voltage rectifier devices in compatible equipment circuits. One level of product assurance is provided for each device as specified in MIL-PRF-19500.

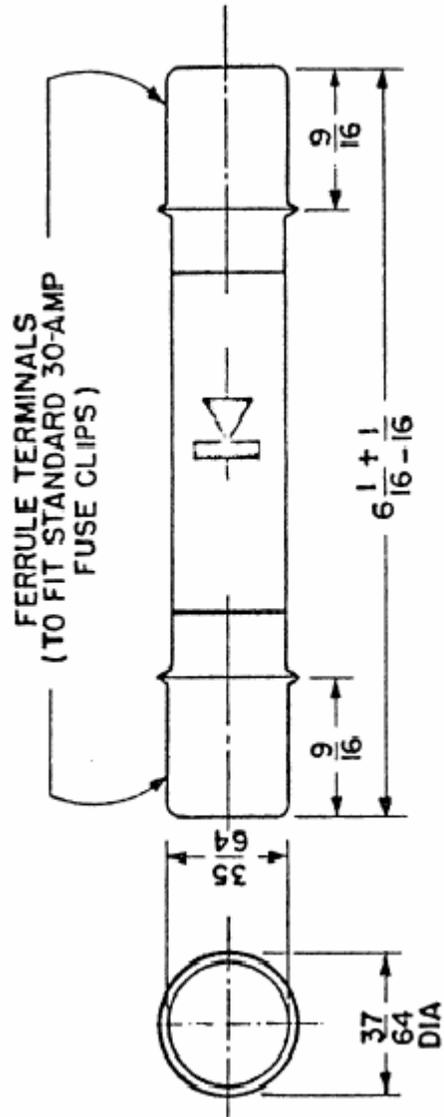
1.2 Physical dimensions. See figure 1.

- \* 1.3 Maximum ratings. Unless otherwise specified,  $T_C = +25^\circ\text{C}$ .

Type	$V_r$	$V_R$ $T_A = +125^\circ\text{C}$	$V_R$ $T_C = +100^\circ\text{C}$	$I_o$ $T_C = +100^\circ\text{C}$	$I_t(\text{surge})$ 1/120 sec	$T_J$ and $T_{STG}$	Barometric pressure (1)
	<u>kV dc</u>	<u>kV dc</u>	<u>kV ac(rms)</u>	<u>mA dc</u>	<u>A</u>		<u>ft</u>
1N1147	14.4	12	8.4	45	10	-65° to +150°C	40,000
1N1149	19.2	16	11.2	45	10	-65° to +150°C	30,000

- (1) Operating altitude (barometric pressure) maximum, without derating. For higher altitude, derate maximum permissible peak reverse voltage in accordance with figure 2 herein.

\* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to [Semiconductor@dsc.dla.mil](mailto:Semiconductor@dsc.dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil/>.



\* FIGURE 1. Physical dimensions for 1N1147, 1N1149.

## 2. APPLICABLE DOCUMENTS

\* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 of documents cited in sections 3, 4, or 5 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 cited in the solicitation or contract.

#### \* DEPARTMENT OF DEFENSE SPECIFICATIONS

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

#### \* DEPARTMENT OF DEFENSE STANDARDS

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

\* (Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, 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 individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

\* 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 manufacturers list before contract award (see 4.2 and 6.3).

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

\* 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1.

\* 3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

\* 3.4.2 Operating position. The diodes shall be capable of proper operation in any position.

\* 3.4.3 Polarity marking. The graphic symbol for polarity indication on the semiconductor on the semiconductor diode shall be as designated in MIL-PRF-19500.

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

\* 3.6 Electrical test requirements. The electrical test requirements shall be as specified in table I.

\* 3.7 Marking. Marking shall be in accordance with MIL-PRF-19500.

\* 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

a. Qualification inspection (see 4.2).

b. Conformance inspection (see 4.3 and table I).

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

\* 4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

\* 4.3 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

\* 4.3.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein.

\* 4.3.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIb (JAN) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B2	4066	$I_O = 0$ , $V_{ac} = 0$ , $T_C = +100^\circ\text{C}$ min. 10 surges each of 1/120 sec duration at 1 minute intervals.
B3	1026	$V_R = 8.4$ kV dc for 1N1147, $V_R = 11.2$ kV dc for 1N1149, $I_O = 45$ mA dc, $T_C = +100^\circ\text{C}$ min., $f = 60$ Hz

\* 4.3.3 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 in accordance with table I, subgroup 2 herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Not applicable.
C6	1026	$V_R = 8.4$ kV dc for 1N1147, $V_R = 11.2$ kV dc for 1N1149, $I_O = 45$ mA dc, $T_C = +100^\circ\text{C}$ min., $f = 60$ Hz

\* 4.3.4 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 and as specified in table II herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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\* TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u> Visual and mechanical inspection	2071					
<u>Subgroup 2</u> Forward voltage	4011	$I_F = 0.3 \text{ A dc}$	$V_{F1}$		45	V dc
Reverse current leakage 1N1147 1N1149	4016	$V_R = 14.4 \text{ kV dc}$ $V_R = 19.2 \text{ kV dc}$	$I_{R1}$		100	$\mu\text{A dc}$
<u>Subgroup 3</u> High temperature operation:		$T_A = +125^\circ\text{C}$				
Reverse current leakage 1N1147 1N1149	4016	$V_R = 12 \text{ kV dc}$ $V_R = 16 \text{ kV dc}$	$I_{R2}$		100	$\mu\text{A dc}$
<u>Subgroups 4, 5, 6, and 7</u> Not applicable						

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

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\* TABLE II. Group E inspection for (all quality levels) for qualification or re-qualification only.

Inspection	MIL-STD-750		Sampling plan
	Method	Conditions	
<u>Subgroup 1</u>			
Temperature cycling	1051	500 cycles	12 devices c = 0
Electrical measurements		See table I, subgroup 2	
<u>Subgroup 2</u>			
Steady-state operating life 1N1147 1N1149	1026	T <sub>C</sub> = +100°C, I <sub>O</sub> = 45 mA dc, f = 60 Hz V <sub>R</sub> = 8.4 kV V <sub>R</sub> = 11.2 kV	12 devices c = 0
Electrical measurements		See table I, subgroup 2	
<u>Subgroup 4</u>			
Thermal impedance curves		Each supplier shall submit their qual-lot average and design maximum thermal impedance curves. In addition, the optimal test conditions and Z <sub>θJX</sub> limit shall be provided to the qualifying activity in the qualification report.	
<u>Subgroup 5</u>			
Barometric pressure 1N1147 1N1149	1001	Pressure = 140 mmHg Pressure = 225 mmHg	15 devices c = 0
<u>Subgroup 6</u>			
ESD	1020		3 devices

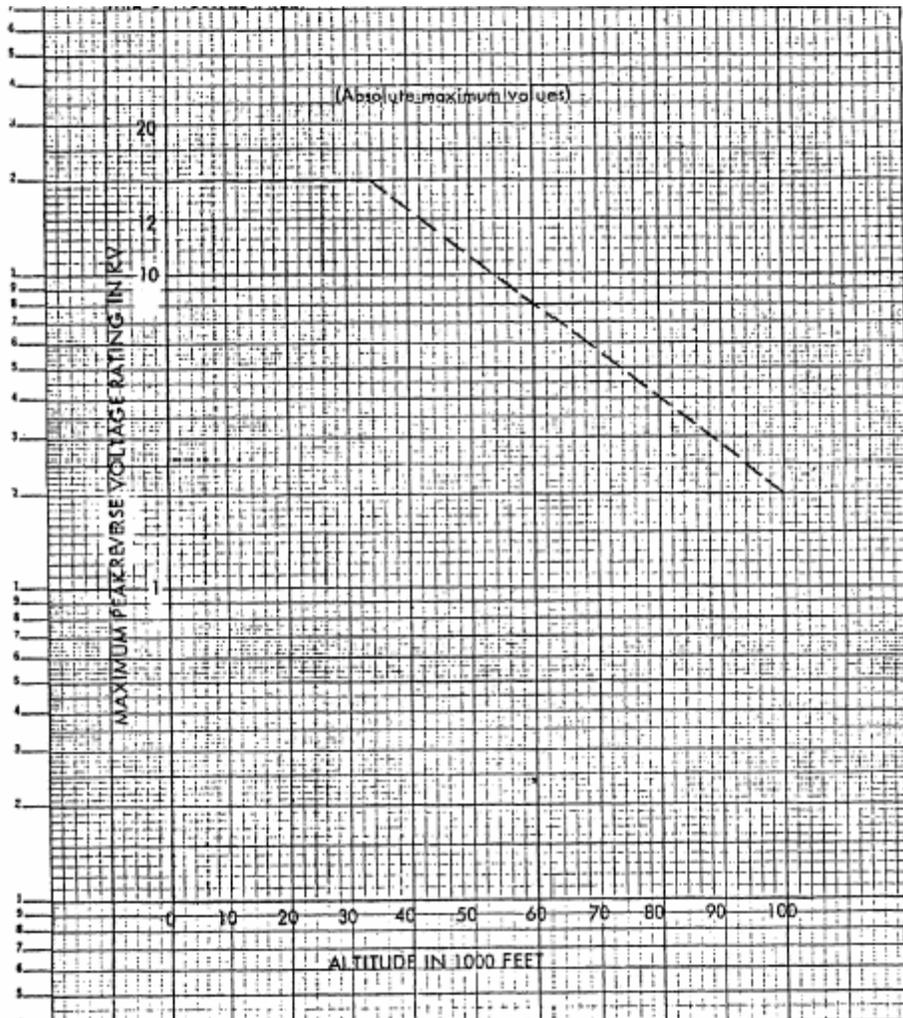


FIGURE 2. Derating curve: Voltage vs altitude operation.

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 or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

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

\* 6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. Product assurance level and type designator.

\* 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 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 43218-3990 or e-mail [vqe.chief@dla.mil](mailto:vqe.chief@dla.mil).

\* 6.4 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Army - CR  
DLA - CC

Preparing activity:  
DLA - CC

(Project 5961-2953)

Review activities:  
Army-AR, MI, SM

\* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/> .