The documentation and process conversion measures necessary to comply with this revision shall be completed by 2 July 2004.

INCH-POUND
MIL-PRF-19500/463G
2 April 2004
SUPERSEDING
MIL-PRF-19500/463F
24 June 2003

* PERFORMANCE SPECIFICATION SHEET

* SEMICONDUCTOR DEVICE, DIODE, SILICON, CURRENT REGULATOR, TYPES 1N5283-1 THROUGH 1N5314-1, AND 1N5283UR-1 THROUGH 1N5314UR-1, 1N7048-1 THROUGH 1N7055-1, 1N7048UR-1 THROUGH 1N7055UR-1, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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 100 volt, silicon, current regulator diodes. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figure 1 (DO-7), figure 2 (DO-213AB), and figure 3 (JANHC and JANKC).

1.3 Maximum ratings. Maximum ratings are as shown in maximum test ratings (see 3.10) and as follows:

a. P_T = 500 mW (DO-7) at T_L = +50°C, L = .375 inch (9.53 mm); both ends of case or diode body to heat sink at L = .375 inch (9.53 mm). (Derate to 0 at +175°C).

b. P_T = 500 mW (DO-213AB) at T_{EC} = +125°C. (Derate to 0 at +175°C).

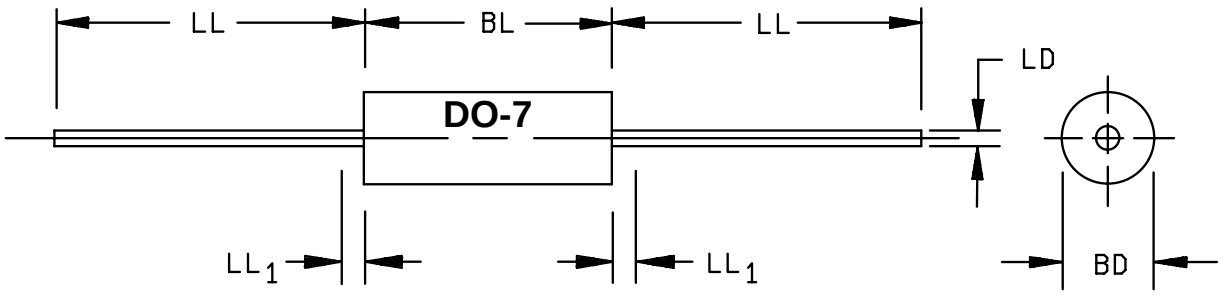
c. -65°C ≤ T_j ≤ +175°C; -65°C ≤ T_{STG} ≤ +175°C.

1.4 Primary electrical characteristics. Primary electrical ratings are as shown in maximum test ratings (see 3.10) and as follows, (nominally .22 mA dc ≤ I_P ≤ 4.70 mA dc):

a. $R_{\Theta JL}$ = 250°C/W (maximum) at L = .375 inch (9.53 mm) (DO-7).

b. $R_{\Theta JEC}$ = 100°C/W (maximum) junction to end-caps (DO-213AB).

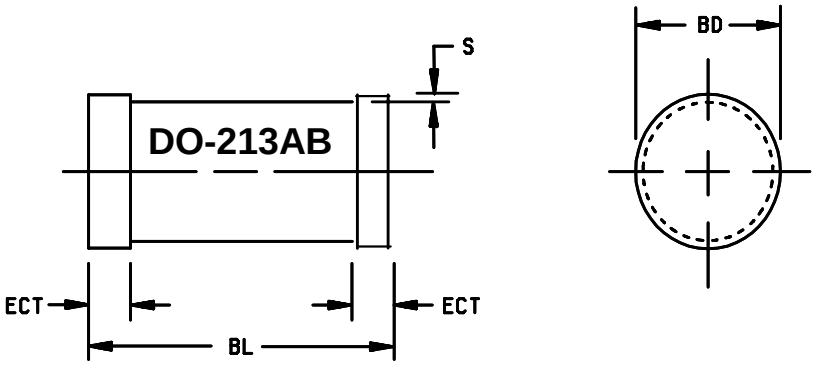
* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, or emailed to Semiconductor@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://www.dodssp.daps.mil.



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.060	.107	1.52	2.72	3
BL	.120	.300	3.05	7.62	3
LD	.018	.023	0.46	0.58	
LL	1.000	1.500	25.40	38.10	
LL_1		0.050		1.27	4

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. The minimum body diameter shall be maintained over .15 inch (0.38 mm) inch of body length.
4. The specified lead diameter applies in the zone between .050 inch (1.27 mm) and the end of the lead. Outside of this zone the lead diameter shall not exceed LD.
5. Both leads shall be within the specified dimension.
6. See 3.3 for L and T_L definitions.
7. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

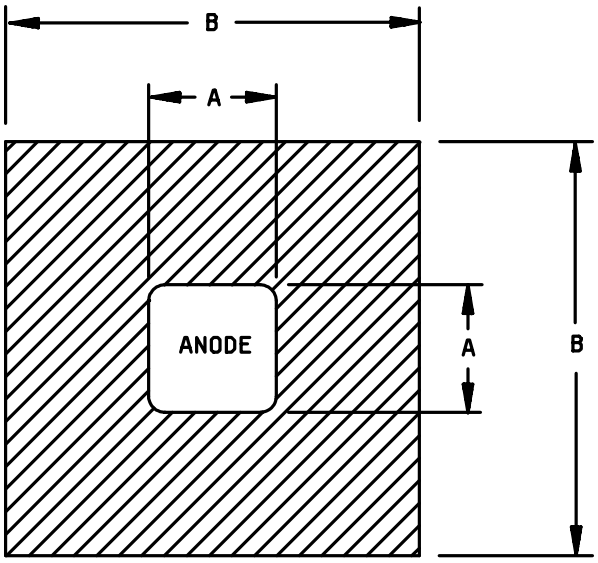
FIGURE 1. Physical dimensions (DO-7).



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.094	.105	2.39	2.67
BL	.189	.205	4.80	5.21
ECT	.016	.022	0.41	0.55
S	.001 min		0.03 min	

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

FIGURE 2. Physical dimensions (DO-213AB).



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.012	.014	0.305	0.355
B	.026	.030	0.660	0.762

Design data

Metallization:
Top: (Anode) ..... Al.
Back: (Cathode) .... Au.
Al thickness ..... 25000 Å Min.
Gold thickness ..... 4000 Å Min.
Chip thickness ..... .010 ±.002 inch (0.254 ±0.0508 mm).

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

FIGURE 3. Physical dimensions, JANHCA and JANKCA die.

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://www.dodssp.daps.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 shall be as specified in MIL-PRF-19500 and as follows:

I_P - Pinch-off current. I_P Pinch-off current is defined as the regulator current at specified test voltage, V_S.

L - Lead thermal path length. Lead thermal path length is the distance from the end of the diode body to the point of lead-temperature measurement. For purposes of this measurement, the same heat sinking at the same distance from the diode body shall be applied to each lead. No heat sinking shall occur between the diode body and the point of lead-temperature measurement. This measurement may be made from either end of the diode body. (The diode body includes slugs, if any, but does not include braze fillet, paint, etc., within the zone of uncontrollable lead diameter.)

P_D - Steady-state power dissipation. Power dissipated under steady-state conditions.

T_L - Lead temperature. Lead temperature is the temperature of the lead measured at the lead thermal path length, L. Lead temperature shall be measured by means of a No. 30 copper-constantan thermocouple, or equivalent. All reference to T_L is T_{EC} for "UR" devices.

V_{POV} - Peak operating voltage. Peak operating voltage is the maximum voltage that shall be applied to the device.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, figure 1 (DO-7), figure 2 (DO-213AB), and figure 3 (JANHC and JANKC die) herein.

3.5 Dash-one construction. These devices shall be of double plug construction utilizing 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 or II in appendix A of MIL-PRF-19500.

3.5.1 JANS construction. Construction shall be dash one, category I or II metallurgical bond in accordance with appendix A of MIL-PRF-19500.

3.5.2 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.

* 3.6 Lead finish. Unless otherwise specified, 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).

* 3.7 Marking. Marking shall be in accordance with MIL-PRF-19500. Manufacturers identification and date code shall be marked on the devices. The polarity shall be indicated with a contrasting color band to denote the cathode end. No color coding will be permitted. Initial container package marking shall be in accordance with MIL-PRF-19500.

* 3.7.1 UR devices. For UR version devices only, all marking, except polarity (and serial number for JANS) may be omitted from the body, but shall be retained on the initial container. UR devices shall be marked with a cathode band as a minimum; or a minimum of three evenly spaced contrasting color dots around the periphery of the cathode end may be used.

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

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

3.10 Maximum test ratings. Test ratings shall be as shown in table II.

3.11 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 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 group E tests, the tests specified in 4.7.4 herein shall be performed on the first inspection lot to this revision to maintain qualification.

4.2.2 JANHC and JANKC devices. Qualification for shall be in accordance with appendix G of MIL-PRF-19500.

4.3 Screening (JAN, JANTXV, JANTX, and JANS 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	JANTX and JANTXV levels	JAN level (3)
3a	Temperature cycling	Temperature cycling	Temperature cycling (in accordance with MIL-PRF-19500, JANTX level)
(1) 3c	Thermal impedance (see 4.3.3)	Thermal impedance (see 4.3.3)	Thermal impedance (see 4.3.3)
9	I_{P1}	Not applicable	Not applicable
10	V_{POV} = Col 11, table II at T_A = +25°C t = 48 hours	V_{POV} = Col 11, table II at T_A = +25°C t = 48 hours	V_{POV} = Col 11, table II at T_A = +25°C t = 48 hours
11	Subgroup 2 of table I herein; $\Delta I_{P1} \leq 5$ percent of initial value	Subgroup 2 of table I herein	Subgroup 2 of table I herein
12	See 4.3.2	See 4.3.2	Not applicable
(2) 13	Subgroup 2 of table I herein; $\Delta I_{P1} \leq 5$ percent of initial value.	Subgroup 2 of table I herein; $\Delta I_{P1} \leq 5$ percent of initial value.	Not applicable

(1) Thermal impedance may 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) When thermal impedance is performed prior to screen 13, it is not required to be repeated in screen 13.
(3) Screens 3a, 3c, 10, and 11 are the only screens required for JAN level product.

4.3.1 Screening (JANHC or JANKC). Screening of die shall be in accordance with appendix G of MIL-PRF-19500. As a minimum, die shall be 100-percent probed to ensure compliance with table I, subgroup 2 (with the exception of thermal impedance).

4.3.2 Power burn-in conditions. Power burn-in conditions are as follows: I_R = 200 mA dc minimum; mounting and test conditions in accordance with method 1038 of MIL-STD-750, test condition B, T_{EC} = +75°C to +125°C for surface mount devices. T_A = room ambient as defined in the general requirements of 4.5 of MIL-STD-750.

* 4.3.3 Thermal impedance $Z_{\Theta JX}$ measurements for screening. The $Z_{\Theta JX}$ measurements shall be performed in accordance with method 3101 of MIL-STD-750, (V_R to be used in lieu of V_F). The maximum limit (not to exceed the table I, subgroup 2 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 $\bar{X}$, 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.

a. I_M measurement current 1 mA - 10 mA.

b. I_H forward heating current .5 A - 1.0 A.

c. t_H heating time 10 ms.

d. t_{MD} measurement delay time 70 µs maximum.

* 4.3.3.1 For initial qualification or requalification. Read and record data ($Z_{\Theta JX}$) shall be supplied to the qualifying activity on one lot (random sample of 500 devices minimum) prior to shipment. Twenty-two samples shall be serialized and provided to the qualifying activity for test correlation.

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

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 VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with table I, subgroup 2 herein.

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

Subgroup	Method	Condition
B4	1037	2,000 cycles; test conditions in accordance with 4.3.2: $t_{on} = t_{off}$ 30 seconds minimum.
B5	1027	I_R = 200 mA dc, T_A = +125°C or adjusted as required to give an average lot T_J = +175°C. Marking legibility requirements shall not apply.

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

Subgroup	Method	Condition
B3	1027	V_{POV} = Col 11, table II; T_A = +25°C; L = .375 inch (9.53 mm) (non-surface mount), L = 0 inch for surface mount.
B5		Not applicable.
B6	1032	T_A = +175°C.

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) and delta requirements shall be in accordance with table I, subgroup 2 herein.

Subgroup	Method	Condition
C2	2036	(Not applicable to surface mount devices); lead fatigue conditions: Test condition E; .062 inch (1.57 mm) lead restriction from case. Test condition A; 4 pounds, 15 seconds.
C5	3101 or 4081	$R_{\Theta JL}$ at L = .375 inch (9.52 mm) ≤ 250°C/W, $R_{\Theta JEC}$ at L = 0 lead length ≤ 100°C/W, see 4.5.3. $R_{\Theta JEC}$ = 100°C/W (maximum) at zero lead length (for UR)
C6	1026	V_{POV} = Col 11, table II; T_A = +25°C; L = .375 inch (9.53 mm) (non-surface mount), L = 0 inch for surface mount.
C7		See 4.6 and 4.7.3.

* 4.5 Thermal resistance. Thermal resistance measurement shall be in accordance with method 3101 of MIL-STD-750. Forced moving air or draft shall not be permitted across the device during heat. The maximum limit for $R_{\Theta JL}$ under these test conditions shall be $R_{\Theta JL}$ (max) = 250°C/W or $R_{\Theta JEC}$ = 100°C/W. The following conditions shall apply:

a. I_M 1 mA to 10 mA.

b. I_H 200 mA to 400 mA.

c. t_H 30 seconds minimum.

d. t_{MD} 70 µs maximum.

LS = lead spacing = .375 inch (9.53 mm) (2 places) for non-surface mount and 0 inch for surface mount (see figure 4).

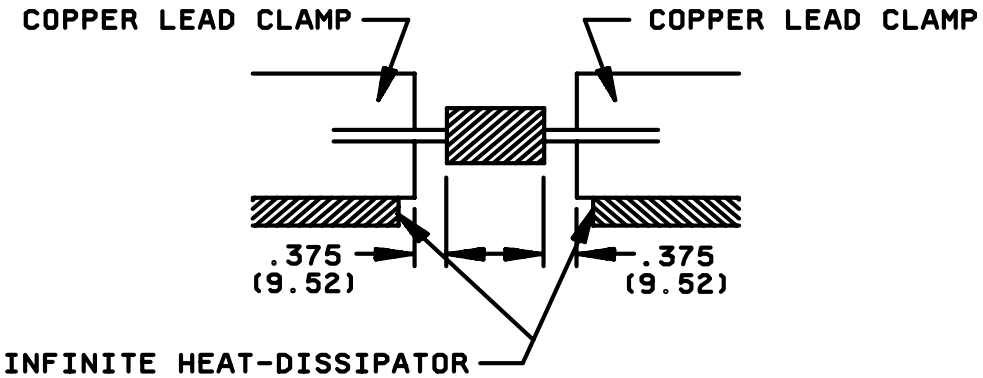


FIGURE 4. Mounting conditions.

4.5.1 For initial qualifications and re-qualifications. Read and record data in accordance with 4.7.4 herein and shall be included in the qualification report.

4.6 Temperature coefficient of regulator current. The temperature coefficient of regulator current shall be tested under the following conditions: (sampling plan: 22 devices, c = 0).

a. Test 1: V_S = 25 V dc, T_{L1} = -55°C, T_{L2} = +25°C, L = .375 inch (9.53 mm) (non-surface mount), L = 0 inch (surface mount) (see 3.3 and 4.7.3) with the maximum limit in accordance with column 8 of table II.

b. Test 2: V_S = 25 V dc, T_{L1} = +25°C, T_{L2} = +150°C, L = .375 inch (9.53 mm) (non-surface mount), L = 0 inch (surface mount) (see 3.3 and 4.7.3) with the maximum limit in accordance with column 9 of table II.

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

4.7.1 Knee ac impedance (Z_k) at test voltage V_K. To test for Z_k, a 90 Hz signal V_K (mod) with rms value equal to 10 percent of test voltage, V_K, is superimposed on the test voltage (see figure 5).

4.7.2 Regulator impedance (Z_S) at test voltage V_S. To test for Z_S, a 90 Hz signal V_S (mod) with rms value equal to 10 percent of test voltage, V_S, is superimposed on the test voltage (see figure 6).

4.7.3 Temperature coefficient of regulator current ($\propto I_S$). Temperature coefficient of regulator current shall be calculated as follows:

$$\propto I_S = \frac{I_P (T_{L2}) - I_P (T_{L1})}{I_P (T_L = +25°C)\Delta T_L} \quad x \quad 100$$

4.7.4 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) and delta requirements shall be in accordance with the applicable steps and footnotes of table I, subgroup 2 herein.

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

Inspections	MIL-STD-750		Sample plan
	Method	Condition	
E1	1051	500 cycles	45 devices, c = 0
E2	1037	6,000 cycles (see 4.3.2) $t_{on} = t_{off}$ = 30 seconds minimum	45 devices, c = 0
E3	2101	Cross section; scribe and break. Separate samples to be used for each test.	3 devices, c = 0
E4		Each supplier shall submit their (typical) design thermal impedance curves. In addition, test conditions and $Z_{\Theta JX}$ limit shall be provided to the qualifying activity in the qualification report.	
E6	1020	As applicable.	3 devices, c = 0

* TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limit 2/		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Regulator current		V_S = 25 V dc, t = 90 s or thermal equilibrium, 1N5283-1 - 1N5314-1 t = pulse measurement, 10mS max 1N7048-1 - 1N7055-1 T_L = +30°C ±3°C (see figure 5)	I_{P1}	Column 3	Column 4	mA dc
Limiting voltage		I_L = .8 I_p (min), col. 3 of table II (see figure 6)	V_L		Column 7	V dc
Reverse voltage		I_R = 200 mA	V_R		2.5	V dc
Thermal impedance	3101	See 4.3.3	$Z_{\Theta JX}$		25	°C/W
Subgroup 3						
Not applicable						
Subgroup 4						
Regulator impedance		V_S = 25 V dc; (see figure 7 and 4.7.2)	Z_S	Column 5		MΩ
Knee impedance		V_K = 6.0 V dc, (see figure 8 and 4.7.1)	Z_K	Column 6		MΩ
Subgroups 5 and 6						
Not applicable						
Subgroup 7						
Regulator current		V_S = Col 11, table II, T = 90s or thermal equilibrium, 1N5283-1 - 1N5314-1 t = pulse measurement, 10 mS max 1N7048-1 - 1N7055-1 T_L = +30°C ±3°C (see figure 5)	I_{P2}		Column 10	mA dc

1/ For sampling plan, see MIL-PRF-19500.
2/ Column references are to table II herein.

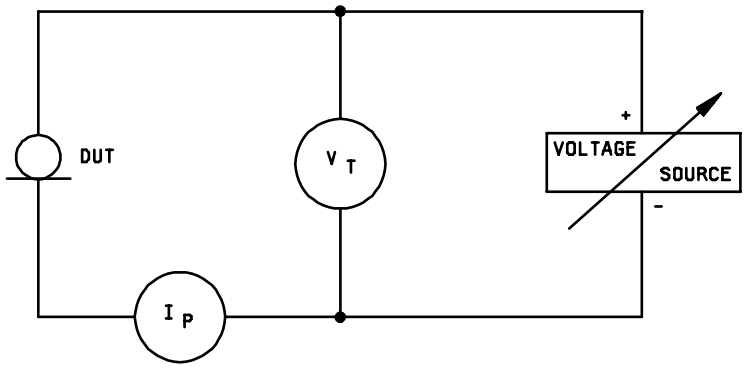
TABLE II. Electrical characteristics. 1/

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8		Col 9		Col 10	Col 11
Type (Electrical characteristics for "UR" and "-1" suffix devices are identical.)	I_{P1} regulator current (mA) at V_S = 25 V			Z_S minimum regulator impedance at V_S = 25 V	Z_K minimum knee impedance at V_K = 6 V	V_L maximum limiting voltage at I_L = 0.8 I_P (min)	α I_S maximum regulator current T_C at V_S = 25V -55°C +25°C (%/°C)		α I_S maximum regulator current T_C at V_S = 25V +25°C +150°C (%/°C)		I_{P2} regulator current (mA) at V_S = Col 11	V_{POV} Peak Operating Volts (DC)
	Nom	Min	Max	MΩ	MΩ	Volts	Min	Max	Min	Max	Max	Volts
1N5283-1	0.22	0.198	0.242	25.0	2.75	1.00	- .20	1.15	- .16	0.60	.27	100
1N5284-1	0.24	0.216	0.264	19.0	2.35	1.00	- .20	1.05	- .20	0.56	.30	100
1N5285-1	0.27	0.243	0.297	14.0	1.95	1.00	- .30	0.95	- .22	0.48	.33	100
1N5286-1	0.30	0.270	0.330	9.0	1.60	1.00	- .35	0.85	- .25	0.42	.36	100
1N5287-1	0.33	0.297	0.363	6.6	1.35	1.00	- .40	0.75	- .26	0.37	.40	100
1N5288-1	0.39	0.351	0.429	4.10	1.00	1.05	- .50	0.62	- .30	0.28	.47	100
1N5289-1	0.43	0.387	0.473	3.30	0.870	1.05	- .52	0.55	- .32	0.23	.52	100
1N5290-1	0.47	0.423	0.517	2.70	0.750	1.05	- .55	0.50	- .33	0.18	.57	100
1N5291-1	0.56	0.504	0.616	1.90	0.560	1.10	- .60	0.35	- .36	0.10	.68	100
1N5292-1	0.62	0.558	0.682	1.55	0.470	1.13	- .62	0.25	- .37	0.05	.75	100
1N5293-1	0.68	0.612	0.748	1.35	0.400	1.15	- .65	0.20	- .38	0.02	.82	100
1N5294-1	0.75	0.675	0.825	1.15	0.335	1.20	- .70	0.15	- .40	- .03	.91	100
1N5295-1	0.82	0.738	0.902	1.00	0.290	1.25	- .72	0.07	- .41	- .07	.99	100
1N5296-1	0.91	0.819	1.001	0.880	0.240	1.29	- .76	0.0	- .42	- .10	1.10	100
1N5297-1	1.00	0.900	1.100	0.800	0.205	1.35	- .78	0.05	- .44	- .10	1.21	100
1N5298-1	1.10	0.990	1.210	0.700	0.180	1.40	- .80	-.10	- .46	- .10	1.33	100
1N5299-1	1.20	1.08	1.32	0.640	0.155	1.45	- .83	-.15	- .47	- .10	1.45	100
1N5300-1	1.30	1.17	1.43	0.580	0.135	1.50	- .85	-.20	- .48	- .10	1.57	100
1N5301-1	1.40	1.26	1.54	0.540	0.115	1.55	- .88	-.20	- .49	- .10	1.69	100
1N5302-1	1.50	1.35	1.65	0.510	0.105	1.60	- .90	-.20	- .50	- .10	1.81	100

TABLE II. Electrical characteristics - Continued. 1/

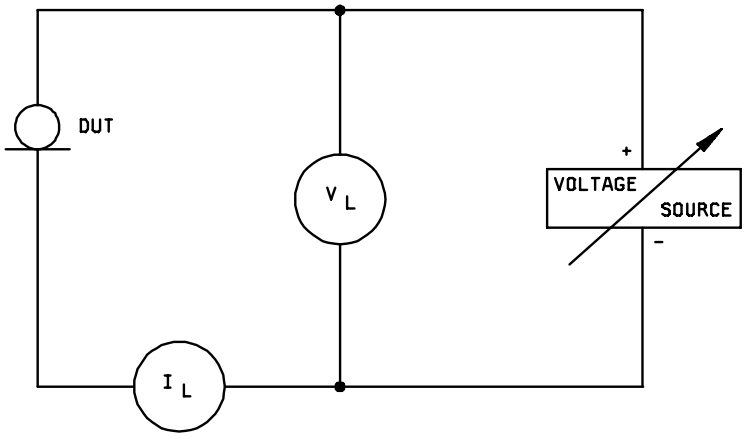
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8		Col 9		Col 10	Col 11
Type (Electrical characteristics for "UR" and "-1" suffix devices are identical.)	I_{P1} regulator current (mA) at V_S = 25 V			Z_S minimum regulator impedance at V_S = 25 V	Z_k minimum knee impedance at V_K = 6 V	V_L maximum limiting voltage at I_L = 0.8 I_P (min)	αI_S maximum regulator current T_C at V_S = 25V -55°C +25°C (%/°C)		αI_S maximum regulator current T_C at V_S = 25V +25°C +150°C (%/°C)		I_{P2} regulator current (mA) at V_S = Col 11	V_{POV} Peak Operating Volts (DC)
	Nom	Min	Max	MΩ	MΩ	Volts	Min	Max	Min	Max	Max	Volts
1N5303-1	1.60	1.44	1.76	0.475	0.092	1.65	- .90	-.20	- .50	- .10	1.92	100
1N5304-1	1.80	1.62	1.98	0.420	0.074	1.75	- .92	-.20	- .51	- .10	2.18	100
1N5305-1	2.00	1.80	2.20	0.395	0.061	1.85	- .95	-.20	- .52	- .10	2.42	100
1N5306-1	2.20	1.98	2.42	0.370	0.052	1.95	- .96	-.20	- .52	- .10	2.66	100
1N5307-1	2.40	2.16	2.64	0.345	0.044	2.00	- .98	-.20	- .53	- .10	2.90	100
1N5308-1	2.70	2.43	2.97	0.320	0.035	2.15	-1.0	-.20	- .53	- .10	3.27	100
1N5309-1	3.00	2.70	3.30	0.300	0.029	2.25	-1.01	-.20	- .53	- .10	3.63	100
1N5310-1	3.30	2.97	3.63	0.280	0.024	2.35	-1.02	-.20	- .54	- .10	3.99	100
1N5311-1	3.60	3.24	3.96	0.265	0.020	2.50	-1.03	-.20	- .54	- .10	4.36	100
1N5312-1	3.90	3.51	4.29	0.255	0.017	2.60	-1.04	-.20	- .55	- .10	4.72	100
1N5313-1	4.30	3.87	4.73	0.245	0.014	2.75	-1.05	-.20	- .55	- .10	5.20	100
1N5314-1	4.70	4.23	5.17	0.235	0.012	2.90	-1.06	-.20	- .55	- .10	5.69	100
1N7048-1	5.1	4.59	5.61	0.100	0.004	3.67	-1.06	-.20	- .55	- .10	6.89	80
1N7049-1	5.6	5.04	6.16	0.090	0.004	4.03	-1.06	-.20	- .55	- .10	7.54	80
1N7050-1	6.2	5.58	6.82	0.080	0.003	4.46	-1.06	-.20	- .55	- .10	8.38	70
1N7051-1	6.8	6.12	7.48	0.070	0.002	4.90	-1.06	-.20	- .55	- .10	9.20	70
1N7052-1	7.5	6.75	8.25	0.050	0.0015	5.40	-1.06	-.20	- .55	- .10	10.20	60
1N7053-1	8.2	7.38	9.02	0.030	0.0015	5.90	-1.06	-.20	- .55	- .10	11.20	60
1N7054-1	9.1	8.19	10.01	0.020	0.001	6.55	-1.06	-.20	- .55	- .10	12.40	50
1N7055-1	10.0	9.00	11.10	0.010	0.001	7.20	-1.06	-.20	- .55	- .10	14.40	50

1/ Electrical characteristics are for all package styles.



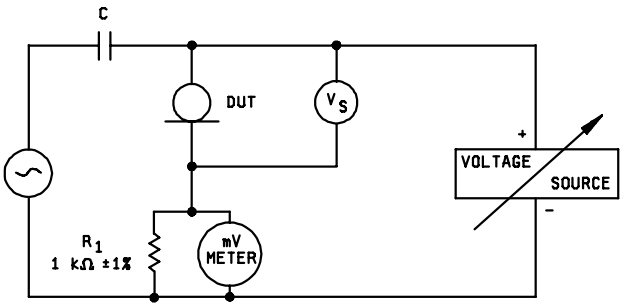
NOTES:
1. Adjust voltage source so that V_S = 25 V dc.
2. Measure current I_P.
3. The device is acceptable if the current falls within the limits specified.
4. The ammeter shall represent essentially a short-circuit to the terminals between which the current is being measured. If not, the voltmeter reading shall be corrected for the drop across the ammeter.

FIGURE 5. Regulator current test circuit.



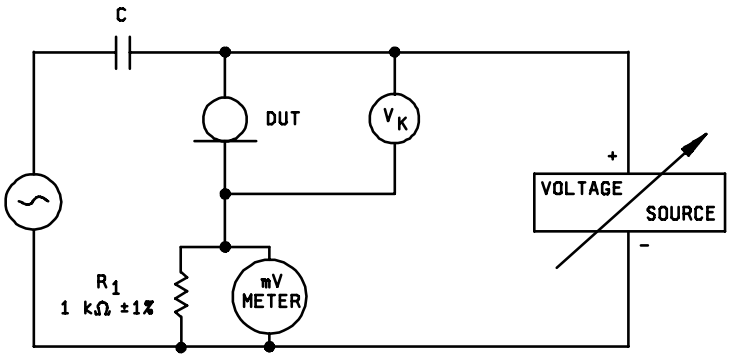
NOTES:
1. Adjust current source so that I_L = .8 I_P (min).
2. Measure voltage V_L.
3. The device is acceptable if the voltage is less than the limit specified.
4. The ammeter shall represent essentially a short-circuit to the terminals between which the current is being measured. If not, the voltmeter reading shall be corrected for the drop across the ammeter.

FIGURE 6. Limiting voltage test circuit.



NOTES:
1. Adjust voltage source so that V_S = 25 Vdc.
2. Apply an ac signal of 2.5 V rms at 90 Hz through an isolating capacitor C.
3. Measure the ac rms voltage.
4. $z_S = V_S$ mod x ($R_1 \div$ V ac) where V_S mod equals ac signal for note 2 and V ac equals the voltage across R_1.
5. Device is acceptable if the regulator impedance meets the specified minimum limit.

FIGURE 7. Regulator impedance test circuit.



NOTES:
1. Adjust voltage source so that V_K = 6.0 Vdc.
2. Apply an ac signal of .6 Vrms at 90 Hz through an isolating capacitor C.
3. Measure the ac rms voltage.
4. $z_K = V_K$ mod x ($R_1 \div$ V ac) where V_K mod equals ac signal for note 2 and V ac equals the voltage across R_1.
5. Device is acceptable if the knee impedance meets the specified minimum limit.

FIGURE 8. Knee impedance test circuit.

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 3.6).

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 No. 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 43216-5000 or e-mail vqe.chief@dla.mil.

6.4 Suppliers of die. The qualified die suppliers with the applicable letter version (example JANHCA1N5283) will be identified on the QML.

JANC ordering information	
PIN	Manufacturer
1N5283-1 through 1N5314-1	43611
	JANHCA1N5283 through JANHCA1N5314 or JANKCA1N5283 through JANKCA1N5314
1N7048-1 through 1N7055-1	JANHCA1N7048 through JANHCA1N7055 or JANKCA1N7048 through JANKCA1N7055

6.5 Substitutability. Non-dash-one devices have been deleted from this specification. Dash-one devices are a direct substitute for non dash-one devices and are preferred.

6.6 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
Navy - EC
Air Force - 11
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

Review activities:
Army - AR, MI, SM
Navy - AS, MC
Air Force - 19, 99

(Project 5961-2839)

* 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://www.dodssp.daps.mil/.