The documentation and process conversion measures necessary to comply with this revision shall be completed by 21 January 1995

INCH-POUND

MIL-S-19500/435D
21 October 1994
SUPERSEDING
MIL-S-19500/435C
20 January 1994

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, DIODE, SILICON, LOW-NOISE VOLTAGE REGULATOR TYPES
1N4099-1, 1N4099C-1, 1N4099D-1 THROUGH 1N4135-1, 1N4135C-1, 1N4135D-1,
1N4614-1, 1N4614C-1, 1N4614D-1 THROUGH 1N4627-1, 1N4627C-1, 1N4627D-1,
1N4099UR-1, 1N4099CUR-1, 1N4099DUR-1 THROUGH 1N4135UR-1, 1N4135CUR-1, 1N4135DUR-1,
1N4614UR-1, 1N4614CUR-1, 1N4614DUR-1 THROUGH 1N4627UR-1, 1N4627CUR-1, 1N4627DUR-1,
JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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

1. SCOPE

1.1 Scope. This specification covers the detail requirements for 500 milliwatt, silicon, low-noise, voltage regulator diodes with voltage tolerances of 5 percent, 2 percent, and 1 percent. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-S-19500, and two levels of product assurance for each unencapsulated device type (die). For JANHC and JANKC quality levels see 6.4.

1.2 Physical dimensions. See figure 1 (DO-7 and DO-35), figure 2 (DO-213AA), and figure 3 (JANHC and JANKC).

1.3 Maximum ratings. Maximum ratings are as shown in 5 and 10 of table III herein and as follows:

P_T = 500 mW (DO-7, DO-35) at T_L = 50°C, L = .375 (9.53 mm); both ends of case or diode body to heat sink at L = .375 (9.53 mm). (Derate I_Z to 0.0 mA dc at +175°C).

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

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

1.4 Primary electrical characteristics. Primary electrical characteristic columns 2, 7, 8, and 9 of table III herein and as follows:

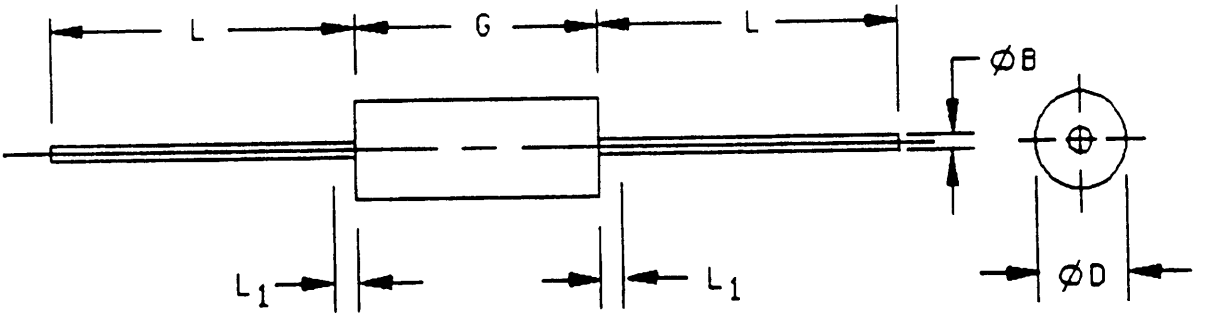
1.8 V dc ≤ V_Z ≤ 100 V dc.

$R_{\theta JL}$ = 250°C/W (maximum) at L = .375 inch (9.53 mm) (DO-7 and DO-35).

$R_{\theta JEC}$ = 100°C/W (maximum) junction to endcaps (DO-213AA).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Electronics Supply Center, ATTN: DESC-ELDT, 1507 Wilmington Pike, Dayton, OH 45444-5765, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

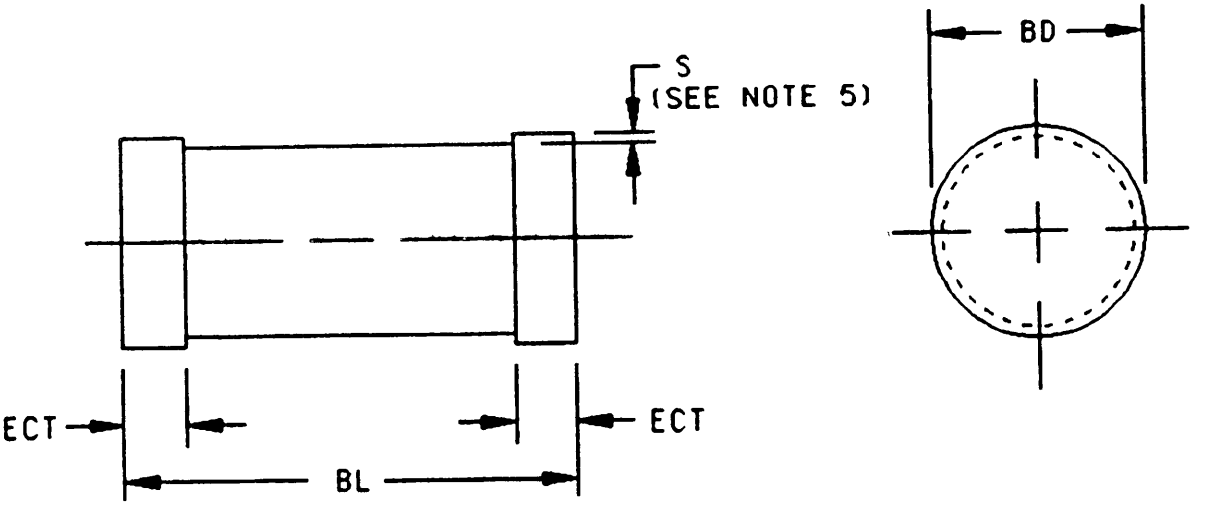
AMSC N/A FSC 5961



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
φD	.055	.107	1.40	2.72	3
φB	.018	.022	0.46	0.56	
G	.120	.300	3.05	7.62	3
L	1.000	1.500	25.40	38.10	
L1	---	.050	---	1.27	4

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Package contour optional within φD and length G. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of φD.
4. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.
5. For DO-7 packages see 3.4.1.

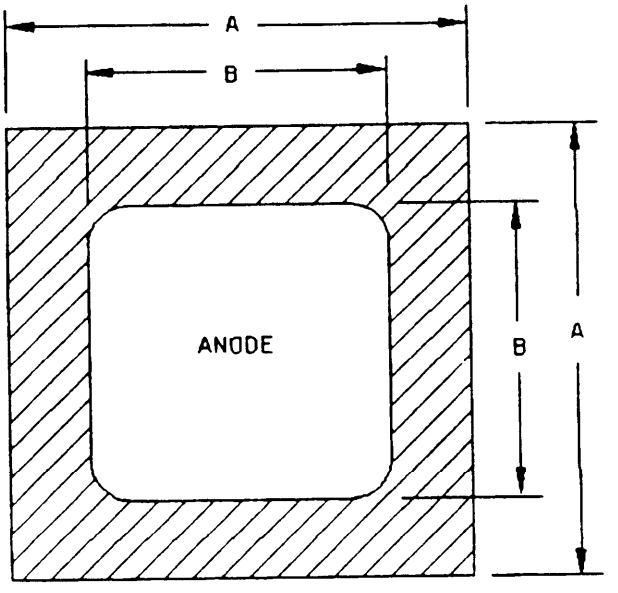
FIGURE 1. Semiconductor device, diode, types 1N4099-1 through 1N4135-1 and 1N4614-1 through 1N4627-1 (DO-35 or DO-7).



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.063	.067	1.60	1.70
ECT	.016	.022	0.41	0.55
BL	.130	.146	3.30	3.70
BL1	.100 ref		2.54 ref	
S	.001 min		0.03 min	

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.

FIGURE 2. Physical dimensions 1N4099UR-1 through 1N4135UR-1 and 1N4614UR-1 through 1N4627UR-1 (DO-213AA).



BACKSIDE IS CATHODE

Ltr	JANCA die dimensions				Ltr	JANCB die dimensions			
	Inches		Millimeters			Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	.021	.025	.53	.63	A	.024	.028	.61	.71
B	.013	.017	.33	.43	B	.017	.021	.43	.53

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The JANCA die thickness is .010 (0.25 mm) ±.002 inches (.05 mm). Anode metallization: Al, thickness = 25,000 Å minimum; cathode metallization: thickness = 4000 Å minimum.
4. The JANCB die thickness is .010 (0.25 mm) ±.002 inches (.05 mm). Anode metallization: Al, thickness = 40,000 Å minimum; cathode metallization: Au, thickness = 5000 Å minimum.
5. Circuit layout data: For zener operation, cathode must be operated positive with respect to anode.
6. Requirements in accordance with appendix H, are performed in a TO-5 package (see 6.5).

FIGURE 3. Physical dimensions JANC dice.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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

MILITARY

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

STANDARD

MILITARY

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 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 Associated detail specification. The individual item requirements shall be in accordance with MIL-S-19500 and as specified herein.

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

UR	Unleaded or surface mounted diodes (round endcaps).
TEC	Temperature of endcap.
C	2 percent voltage tolerance.
D	1 percent voltage tolerance.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, and on figures 1, 2, and 3 herein.

3.3.1 Lead finish. Lead finish shall be solderable as defined in MIL-S-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).

3.3.2 Dash one construction. Dash one (-1) diodes shall be of metallurgically bonded double plug construction in accordance with the requirements of category I, II, or III (see MIL-S-19500).

3.3.3 JANS construction. Construction shall be dash one or straight through construction, category I or II metallurgical bond in accordance with MIL-S-19500, appendix A, 30.14.2 and 30.14.4.

3.3.4 Package outline. This specification contains two standard packages; DO-7 and DO-35. Any user of this specification that has a specific package outline requirement shall specify their preference in the document purchase order. If package style is not specified, the manufacturer may supply either package (see 6.2).

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

3.4.1 DO-7 packages. All DO-7 package devices shall be marked with a "D7" any place on the device within the marking area.

3.4.2 Marking of U version devices. For U suffix (surface mount) devices only, all marking (except polarity) may be omitted from the body, but shall be retained on the initial container.

3.4.2.1 Polarity. The polarity shall be indicated with a contrasting color band to denote the cathode end. Alternately, for surface mount (UR) devices, a minimum of three evenly spaced contrasting color dots around the periphery of the cathode end may be used. No color coding will be permitted.

3.5 Selection of tight tolerance devices. The C and D suffix devices shall be selected from JAN, JANTX, JANTXV, which have successfully completed all applicable screening, and groups A, B, and C testing as 5 percent tolerance devices. All sublots of C and D suffix devices shall pass group A, subgroup 2, at tightened tolerances.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein except lot accumulation period shall be six months in lieu of six weeks.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2.1 JANHC and JANKC devices. JANHC and JANKC devices shall be qualified in accordance with appendix H of MIL-S-19500.

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

4.3 Screening (JANS, JAN, JANTX, and JANTXV levels only). Screening shall be in accordance with table II of MIL-S-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 II of MIL-S-19500)	Measurement		
	JANS level	JANTX and JANTXV levels	JAN level
3a	Temperature cycling	Temperature cycling	Temperature cycling
3c 1/	Thermal impedance (see 4.5.4)	Thermal impedance (see 4.5.4)	Thermal impedance (see 4.5.4)
9	I_R and V_Z	Not applicable	Not applicable
11	I_R and V_Z; ΔI_R = 100 percent of initial reading or 10 nA dc, ΔV_Z = ±2 percent of initial reading.	I_R and V_Z	Not applicable
12	See 4.3.2	See 4.3.2, t = 48 hours	Not applicable
13 2/	ΔI_{R1} = 100% of initial reading or 10 nA dc, whichever is greater; ΔV_Z = ±2% of initial reading, subgroup 2 of table I herein.	ΔI_{R1} = 100% of initial reading or 10 nA dc, whichever is greater; ΔV_Z = ±2% of initial reading, subgroup 2 of table I herein.	Not applicable

1/ Thermal impedance may be performed any time after sealing provided temperature cycling is performed in accordance with MIL-S-19500, screen 3 prior to this thermal test.

2/ PDA = 5 percent for screen 13, applies to ΔI_{R1}, ΔV_Z, I_{R1}, and V_Z. Thermal impedance ($Z_{\theta JX}$) is not required in screen 13.

4.3.1 Screening (JANHC and JANKC). Screening of JANHC and JANKC die shall be in accordance with MIL-S-19500, appendix H.

4.3.2 Power burn-in conditions. Power burn-in conditions are as follows: I_{ZM}= column 10 of table III minimum; mounting and test conditions in accordance with MIL-STD-750, method 1038, test condition B, TEC = +75°C to +125°C for surface mount devices. To better utilize burn-in equipment, higher values of I_Z shall be permitted provided:

a. The junction temperature does not exceed +175°C.

b. The power dissipation does not exceed 500 mW.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-S-19500, and table I herein. (End point electrical measurements shall be in accordance with table I, group A, subgroup 2 herein.)

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in tables IVa (JANS) and IVb (JAN, JANTX and JANTXV) of MIL-S-19500, and as follows. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein except $Z_{\theta JX}$ shall be performed after intermittent operation life only.

4.4.2.1 Group B inspection, table IVa (JANS) of MIL-S-19500.

Subgroup	Method	Condition
B4	1037	I_{ZM} = column 10 of table III at T_A = 25°C ± 5°C, t_{on} = t_{off} = 3 minutes minimum for 2,000 cycles. No heat sinking or forced air cooling on the devices shall be permitted (mounting conditions in accordance with figure 5).
B5	1027	I_{ZM} = column 10 of table III for 1000 hours; T_A = Room ambient or adjusted as required to give an average lot T_J = +175°C. Marking legibility requirements shall not apply.
B6	3101 or 4081	For JANS devices only: $R_{\theta JEC}$ = 100°C/W (max) at zero lead length (DO-213AA), +25°C ≤ T_R ≤ +35°C (see 4.3.2). $R_{\theta JL}$ = 250°C/W (max) at L = 0.375 inch (9.53 mm), (DO-7 and DO-35).

4.4.2.2 Group B inspection, table IVb (JAN, JANTX and JANTXV) of MIL-S-19500.

Subgroup	Method	Condition
B3	1027	I_{ZM} = column 10 of table III.
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 V of MIL-S-19500 and as follows. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein except $Z_{\theta JX}$ shall be performed after intermittent operation life only.

Subgroup	Method	Condition
C2	2036	Condition A; 4 pounds; t = 15 seconds (not applicable to "UR" suffix devices). Condition E, (not applicable to "UR" suffix devices).
C6	1026	I_{ZM} = column 10 of table III.
C7	4071	I_{ZM} = 250 µA dc, T_A = +25°C ±5°C, T_Z = +125°C, αV_Z = column 8 of table III, sampling plan = 22 devices, c = 0.

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

4.5.1 Surge current (I_{ZSM}). The peak currents shown in column 5 of table III shall be applied in the reverse direction and these shall be superimposed on the current (I_Z = 250 µA dc) a total of 5 surges at 1 minute intervals. Each individual surge shall be one-half square-wave-pulse of one one-hundred twentieth second duration or an equivalent one-half sinewave with the same effective rms current.

4.5.2 Regulator voltage measurements. The test current shall be applied until thermal equilibrium is attained (20 ±2 seconds maximum) prior to reading the breakdown voltage. For this test, the diode shall be suspended by its leads with mounting clips whose inside edge is located at 0.375 inch (9.53 mm) from the body and the mounting clips shall be maintained at a temperature of +25°C +8°C, -2°C. This measurement may be performed after a shorter time following application of the test current than that which provides thermal equilibrium if correlation to stabilized readings can be established to the satisfaction of the Government.

4.5.3 Temperature coefficient of regulator voltage (αV_Z). The device shall be temperature stabilized with current applied prior to reading regulator voltage at the specified ambient temperature as specified in table I herein, group A, subgroup 7.

4.5.4 Thermal impedance ($Z_{\theta JX}$ measurements). The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3101. The maximum limit for $Z_{\theta JX}$ in screening (table II of MIL-S-19500) shall be derived by each vendor by means of process control. When three lot date codes have exhibited control, the data from these three lots will be used to establish a fixed screening limit, (not to exceed the group A, subgroup 2 limit). Once a fixed limit has been established, monitor all future sealing lots using a five piece sample from each lot to be plotted on the applicable X, R chart.

a.	I_M measurement current	1 mA to 10 mA.
b.	I_H forward heating current	.5 A to 1.0 A.
c.	t_H heating time	10 ms.
d.	t_{MD} measurement delay time	70 µs maximum.

4.5.4.1 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). Twenty-two serialized devices shall be sent to the qualifying activity for test correlation.

4.5.5 Thermal resistance. Thermal resistance measurement shall be in accordance with MIL-STD-750, method 3101 or 4081. Forced moving air or draft shall not be permitted across the device during test. The maximum limit for $R_{\theta JL}$ under these test conditions shall be $R_{\theta JL}$ (max) = 250°C/W, $R_{\theta JEC}$ (max) = 100°C/W. The following conditions shall apply when using method 3101:

a. I_M - - - 1 mA to 10 mA
b. I_H - - - 200 mA to 400 mA
c. t_H - - - 25 seconds minimum
d. t_{MD} - - 70 µs maximum

LS = lead spacing = .375 inch for non surface mount devices and 0 inch for surface mount devices as defined on figure 4 below:

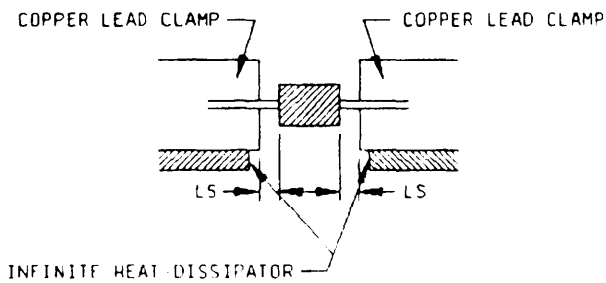


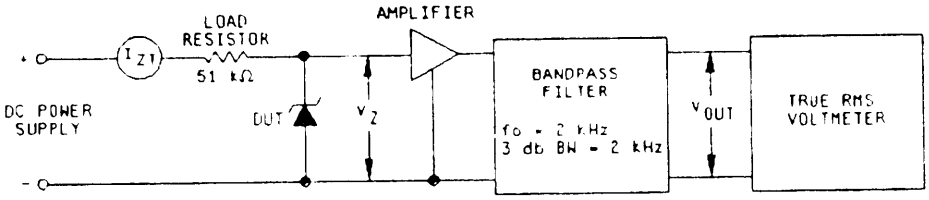
FIGURE 4. Mounting conditions.

2/ Metric equivalents are given for general information only.

4.5.5.1 For initial qualifications and requalifications. Read and record data in accordance with group E herein and shall be included in the qualification report.

4.5.6 Decap internal visual scribe and break. Scratch glass at cavity area with diamond scribe. Carefully snap open. Using 30X magnification examine the area where die (or bonding material) is in contact with the plugs, verify metallurgical bonding area. If the verification of the metallurgical bonding area is in question, test method 3101 and test condition limits herein $Z_{\Theta JX}$ shall be used to determine suitability for use.

4.5.7 Noise density. Noise density shall be measured using a noise density test circuit as shown in figure 5. Place a low-noise resistor, equivalent in value to the dynamic impedance of the diode under test, in the test clips and adjust test current (I_{ZT}) and measure output-noise voltage. Remove resistor, insert diode under test in test clips, readjust test current to 250 μA dc and measure output-noise voltage again. To obtain noise density (N_D), subtract rms resistor output-noise voltage from rms diode output-noise voltage and divide by product of overall system gain and square root of bandwidth. All measurements shall be made at +25°C.



NOTES:
1. Input voltage and lead resistance should be high so that zener can be driven from a constant current source.
2. Input impedance of band pass filter should be high compared with the dynamic impedance of the diode under test.
3. Filter bandwidth characteristics shall be as follows:
   f_o = 2,000 Hz
   Shape factor, -40 db to -3 db, approximately 2.
   Passband at the -3 db is 1,000 hz ±50 Hz to 3,000 Hz ±150 Hz.
   Passband at the -40 db is 500 hz ±50 Hz to 6,000 Hz ±600 Hz.

FIGURE 5. Circuit for determination of noise density.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits 2/		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Forward voltage	4011	I_F = 200 mA dc	V_F		1.1	V dc
Reverse current	4016	DC method; V_R = column 6 of table III	I_{R1}		Column 7	µA dc
Regulator voltage (see 4.5.2)	4022	I_Z = 250 µA dc	V_Z		Column 2	V dc
Thermal impedance	3101	See 4.5.4	$Z_{\theta JX}$		35	°C/W
Subgroup 3						
High-temperature operation		T_A = +150°C				
Reverse current	4016	DC method; V_R = column 6 of table IV	I_{R2}		Column 3	µA dc
Subgroup 4						
Small-signal reverse breakdown impedance	4051	I_Z = 250 µA dc I_{SIG} = 25 µA ac rms	Z_Z		Column 4	ohms
Noise density (see 4.5.7)		I_Z = 250 µA dc	N_D		Column 9	$\mu V/\sqrt{Hz}$
Subgroup 5						
Not applicable						
Subgroup 6 JANS only						
Surge current	4066	(see 4.5.1)	I_{ZSM}		Column 5	mA dc
Electrical measurements		Table I, subgroup 2				
Subgroup 7 JANS only						
Temperature coefficient of regulator voltage(see 4.5.3)	4071	I_Z = 250 µA dc T_1 = +25°C ±5°C; T_2 = T_1 +100°C	$\sim V_Z$		Column 8	%/°C

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

TABLE II. Group E inspection (all product assurance levels).

Inspection 1/	MIL-STD-750		Qualification conformance inspection
	Method	Conditions	
Subgroup 1			
Temperature cycling	1051	500 cycles	22 devices, c = 0
Electrical measurements		See table I, subgroup 2	
Subgroup 2			
Intermittent operation life	1037	6,000 cycles	22 devices, c = 0
Electrical measurements		See table I, subgroup 2	
Subgroup 3			
Not applicable			
Subgroup 4			22 devices, c = 0
Thermal resistance surface mount	3101 or 4081	See 4.5.5	
Thermal resistance leaded	3101 or 4081	See 4.5.5	22 devices, c = 0

1/ A separate sample may be pulled for each test.

TABLE III. Test ratings

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10
	V_Z Nom 1/	I_R at +150°C	Z_{ZT} Max	I_{ZSM} (surge)	V_R	I_R	αV_Z T_1 = +25°C T_2 = +125°C	N_D	I_{ZM}
	Volts	µA dc	ohms	mA	Volts	µA dc	%/°C	$\mu V/\sqrt{Hz}$	mA
1N4614-1	1.8	10.0	1,200	1,600	1.0	3.5	-.075	1	120
1N4615-1	2.0	8.0	1,250	1,500	1.0	2.5	-.075	1	110
1N4616-1	2.2	6.0	1,300	1,350	1.0	2.0	-.075	1	100
1N4617-1	2.4	4.0	1,400	1,250	1.0	1.0	-.075	1	95
1N4618-1	2.7	2.0	1,500	1,100	1.0	0.5	-.075	1	90
1N4619-1	3.0	1.0	1,600	1,025	1.0	0.4	-.075	1	87
1N4620-1	3.3	7.0	1,650	950	1.5	3.5	-.075	1	85
1N4621-1	3.6	10.0	1,700	875	2.0	3.5	-.065	1	83
1N4622-1	3.9	5.0	1,650	825	2.0	2.5	-.060	1	80
1N4623-1	4.3	4.0	1,600	800	2.0	2.0	-.050	1	77
1N4624-1	4.7	10.0	1,550	750	3.0	5.0	+.020,-.050	1	75
1N4625-1	5.1	10.0	1,500	725	3.0	5.0	+.030,-.045	2	70
1N4626-1	5.6	10.0	1,400	700	4.0	5.0	+.040,-.020	4	65
1N4627-1	6.2	10.0	1,200	650	5.0	5.0	+.050,-.010	5	61
1N4099-1	6.8	5.0	200	650	5.2	1.0	+.060	40	56
1N4100-1	7.5	5.0	200	650	5.7	1.0	+.065	40	51
1N4101-1	8.2	5.0	200	650	6.3	0.5	+.070	40	46
1N4102-1	8.7	5.0	200	650	6.7	0.5	+.075	40	44
1N4103-1	9.1	5.0	200	650	7.0	0.5	+.080	40	42
1N4104-1	10.0	5.0	200	650	7.6	0.5	+.080	40	38
1N4105-1	11.0	5.0	200	590	8.5	0.05	+.080	40	35
1N4106-1	12.0	5.0	200	540	9.2	0.05	+.080	40	32
1N4107-1	13.0	5.0	200	500	9.9	0.05	+.080	40	29
1N4108-1	14.0	5.0	200	464	10.7	0.05	+.085	40	27
1N4109-1	15.0	5.0	100	433	11.4	0.05	+.085	40	25

1/ Voltage tolerance devices (e.g., 1N4099-1 is ±5 percent, 1N4099C-1 is ±2 percent, and 1N4099D-1 is ±1 percent tolerance).

TABLE III. Test ratings - Continued.

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10
	V_Z Nom 1/	I_R at +150°C	Z_{ZT} Max	I_{ZSM} (surge)	V_R	I_R	αV_Z T_1 = +25°C T_2 = +125°C	N_D	I_{ZM}
	Volts	µA dc	ohms	mA	Volts	µA dc	%/°C	µV/√Hz	mA
1N4110-1	16.0	5.0	100	406	12.2	0.05	+.085	40	24
1N4111-1	17.0	5.0	100	382	13.0	0.05	+.090	40	22
1N4112-1	18.0	5.0	100	361	13.7	0.05	+.090	40	21
1N4113-1	19.0	2.5	150	342	14.5	0.05	+.090	40	20
1N4114-1	20.0	2.5	150	325	15.2	0.01	+.090	40	19
1N4115-1	22.0	2.5	150	295	16.8	0.01	+.090	40	17
1N4116-1	24.0	2.5	150	271	18.3	0.01	+.090	40	16
1N4117-1	25.0	2.5	150	260	19.0	0.01	+.090	40	15
1N4118-1	27.0	2.5	150	240	20.5	0.01	+.090	40	14
1N4119-1	28.0	2.5	200	232	21.3	0.01	+.095	40	14
1N4120-1	30.0	2.5	200	216	22.8	0.01	+.095	40	13
1N4121-1	33.0	2.5	200	197	25.1	0.01	+.095	40	12
1N4122-1	36.0	2.5	200	180	27.4	0.01	+.095	40	11
1N4123-1	39.0	2.5	200	166	29.7	0.01	+.095	40	9.8
1N4124-1	43.0	2.5	250	151	32.7	0.01	+.095	40	8.9
1N4125-1	47.0	4.0	250	138	35.8	0.01	+.095	40	8.1
1N4126-1	51.0	5.0	300	127	38.8	0.01	+.100	40	7.5
1N4127-1	56.0	5.0	300	116	42.6	0.01	+.100	40	6.7
1N4128-1	60.0	5.0	400	108	45.6	0.01	+.100	40	6.4
1N4129-1	62.0	5.0	500	105	47.1	0.01	+.100	40	6.1
1N4130-1	68.0	7.0	700	95	51.7	0.01	+.100	40	5.6
1N4131-1	75.0	7.0	700	86	57.0	0.01	+.100	40	5.1
1N4132-1	82.0	8.0	800	79	62.4	0.01	+.100	40	4.6
1N4133-1	87.0	8.0	1,000	75	66.2	0.01	+.100	40	4.4
1N4134-1	91.0	10.0	1,200	71	69.2	0.01	+.100	40	4.2
1N4135-1	100.0	10.0	1,600	65	76.0	0.01	+.100	40	3.8

1/ Voltage tolerance devices (example: 1N4099-1 is ±5 percent, 1N4099C-1 is ±2 percent, and 1N4099D-1 is ±1 percent tolerance).

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

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-S-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.

b. Lead finish as applicable (see 3.3.1).

c. Product assurance level, type designation and for die acquisition, the die identification should be specified (see figure 4).

d. Package outline if required, see 3.4.1

e. Device tolerance (see 6.3.2).

6.3 Substitution information.

6.3.1 Substitutability for the -1 devices. The -1 devices are a one way direct substitute for the non -1 devices (example: JANTX1N4614-1 substitutes for JANTX1N4614).

6.3.2 Substitutability of 2 percent and 1 percent tolerance devices. Devices of tighter tolerance are a direct one way substitute for the looser tolerance devices (example: JANTX1N4614D-1 substitutes for JANTX1N4614-1).

6.4 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example: JANHCA1N4614) will be identified on the QPL.

JANC ordering information

PIN 2/	Manufacturer CAGE		PIN 2/	Manufacturer CAGE	
	55801	12954		55801	12954
	1/	1/		1/	1/
1N4099-1	JANHCA1N4099	JANHCB1N4099	1N4124-1	JANHCA1N4124	JANHCB1N4124
1N4100-1	JANHCA1N4100	JANHCB1N4100	1N4125-1	JANHCA1N4125	JANHCB1N4125
1N4101-1	JANHCA1N4101	JANHCB1N4101	1N4126-1	JANHCA1N4126	JANHCB1N4126
1N4102-1	JANHCA1N4102	JANHCB1N4102	1N4127-1	JANHCA1N4127	JANHCB1N4127
1N4103-1	JANHCA1N4103	JANHCB1N4103	1N4128-1	JANHCA1N4128	JANHCB1N4128
1N4104-1	JANHCA1N4104	JANHCB1N4104	1N4129-1	JANHCA1N4129	JANHCB1N4129
1N4105-1	JANHCA1N4105	JANHCB1N4105	1N4130-1	JANHCA1N4130	JANHCB1N4130
1N4106-1	JANHCA1N4106	JANHCB1N4106	1N4131-1	JANHCA1N4131	JANHCB1N4131
1N4107-1	JANHCA1N4107	JANHCB1N4107	1N4132-1	JANHCA1N4132	JANHCB1N4132
1N4108-1	JANHCA1N4108	JANHCB1N4108	1N4133-1	JANHCA1N4133	JANHCB1N4133
1N4109-1	JANHCA1N4109	JANHCB1N4109	1N4134-1	JANHCA1N4134	JANHCB1N4134
1N4110-1	JANHCA1N4110	JANHCB1N4110	1N4135-1	JANHCA1N4135	JANHCB1N4135
1N4111-1	JANHCA1N4111	JANHCB1N4111	1N4614-1	JANHCA1N4614	JANHCB1N4614
1N4112-1	JANHCA1N4112	JANHCB1N4112	1N4615-1	JANHCA1N4615	JANHCB1N4615
1N4113-1	JANHCA1N4113	JANHCB1N4113	1N4616-1	JANHCA1N4616	JANHCB1N4616
1N4114-1	JANHCA1N4114	JANHCB1N4114	1N4617-1	JANHCA1N4617	JANHCB1N4617
1N4115-1	JANHCA1N4115	JANHCB1N4115	1N4618-1	JANHCA1N4618	JANHCB1N4618
1N4116-1	JANHCA1N4116	JANHCB1N4116	1N4619-1	JANHCA1N4619	JANHCB1N4619
1N4117-1	JANHCA1N4117	JANHCB1N4117	1N4620-1	JANHCA1N4620	JANHCB1N4620
1N4118-1	JANHCA1N4118	JANHCB1N4118	1N4621-1	JANHCA1N4621	JANHCB1N4621
1N4119-1	JANHCA1N4119	JANHCB1N4119	1N4622-1	JANHCA1N4622	JANHCB1N4622
1N4120-1	JANHCA1N4120	JANHCB1N4120	1N4623-1	JANHCA1N4623	JANHCB1N4623
1N4121-1	JANHCA1N4121	JANHCB1N4121	1N4624-1	JANHCA1N4624	JANHCB1N4624
1N4122-1	JANHCA1N4122	JANHCB1N4122	1N4625-1	JANHCA1N4625	JANHCB1N4625
1N4123-1	JANHCA1N4123	JANHCB1N4123	1N4626-1	JANHCA1N4626	JANHCB1N4626
			1N4627-1	JANHCA1N4627	JANHCB1N4627

1/ For JANKC level, replace "JANHC" with "JANKC".
2/ C and D tolerance suffix are applicable to JANC chips.

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 extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, AV, MI, SM
Air Force - 19, 70, 80, 85, 99
Navy - AS, CG, MC, OS

Preparing activity:
DLA - ES

(Project 5961-1666)

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.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-S-19500/435D	2. DOCUMENT DATE (YYMMDD) 21 October 1994

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, DIODE, SILICON, LOW-NOISE VOLTAGE REGULATOR TYPES 1N4099-1, 1N4099C-1, 1N4099D-1 THROUGH 1N4135-1, 1N4135C-1, 1N4135D-1, 1N4614-1, 1N4614C-1, 1N4614D-1 THROUGH 1N4627-1, 1N4627C-1, 1N4627D-1, 1N4099UR-1, 1N4099CUR-1, 1N4099DUR-1 THROUGH 1N4135UR-1, 1N4135CUR-1, 1N4135DUR-1, 1N4614UR-1, 1N4614CUR-1, 1N4614DUR-1 THROUGH 1N4627UR-1, 1N4627CUR-1, 1N4627DUR-1, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Alan Barone	b. TELEPHONE (Include Area Code) (1) Commercial 512-296-6048	(2) AUTOVON 986-6048
c. ADDRESS (Include Zip Code) Defense Electronics Supply Center ATTN: DESC-ELDT Dayton, OH. 45444-5765	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	