INCH-POUND

The documentation and process conversion measures necessary to comply with this revision shall be completed by 27 May 2022.

MIL-PRF-19500/115P
w/AMENDMENT 2
27 January 2022
SUPERSEDING
MIL-PRF-19500/115P
w/ AMENDMENT 1
15 January 2017

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, VOLTAGE REGULATOR, TYPES 1N3016 THROUGH 1N3051 AND 1N3821 THROUGH 1N3828 ENCAPSULATED (AXIAL LEADED AND SURFACE MOUNT) AND UNENCAPSULATED, 5, 2, AND 1 PERCENT VOLTAGE TOLERANCE, QUALITY LEVELS JAN, JANTX, JANTXV, AND JANHC

The encapsulated non-dash-one device types specified in this document are inactive for new design as of 5 July 2006 (see 6.6.1 and 6.6.3). The corresponding unencapsulated device types (JANHC) are still active.

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 1 W, silicon, voltage regulator diodes. All of the diodes described by this specification sheet are a modified version of the diode which have a nominal voltage tolerance of 5 percent, 2 percent or 1 percent over the basic numbered (non-suffix) device. The non-suffix devices are not an option for this specification sheet. Three levels of product assurance (JAN, JANTX, and JANTXV) are provided for each encapsulated device type as specified in MIL-PRF-19500. One level of product assurance (JANHC) is provided for each unencapsulated die.

1.2 Package outlines and die topography. The device package for the encapsulated device type are as follows: Inactive for new design axial leaded package style DO-202AA (formerly DO-13) in accordance with figure 1, axial leaded package style DO-204AL (formerly DO-41) in accordance with figure 2, surface mount version DO-213AB in accordance with figure 3. The dimensions and topography for JANHC unencapsulated die are as follows: A version die in accordance with figure 4 and B version die in accordance with figure 5.

1.3 Maximum ratings. Unless otherwise specified T_C = 25°C. Maximum ratings are as shown in maximum and primary characteristics and test ratings (see 3.9 herein) and as follows: -55°C ≤ T_J ≤ +175°C; -55°C ≤ T_{stg} ≤ +175°C.

Package type	Package style	P_{TL} (1)	P_{TPCB} (1)	T_L	T_{EC}
		W	W	°C	°C
DO-202AA, DO-204AL	Axial	1.0 (2)	1	+95	
DO-213AB	Surface mount (UR)	1.0 (3)			+125

(1) See figures 6, 7, and 8 for derating curves.
(2) L = .375 inch (9.53 mm). Both ends of case or diode body to heat sink at L = .375 (9.53 mm). (Derate I_Z to 0 at T_L = +175°C).
(3) Derate to 0 at T_{EC} = +175°C.

Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

AMSC N/A
FSC 5961

1.4 Primary electrical characteristics. Primary electrical characteristics are as shown in primary test ratings (see 3.9 herein) and as follows: 3.3 V dc ≤ V_Z ≤ 200 V dc. Suffix "A" and "B" devices are 5 percent voltage tolerance. Suffix "C" devices are 2 percent voltage tolerance. Suffix "D" devices are 1 percent voltage tolerance.

Type	$R_{\theta JL}$ (1)	$R_{\theta JEC}$ (2)
	°C/W	°C/W
DO-202AA (3)	80	
DO-204AL	80	
DO-213AB		50

(1) L = .375 inch (9.53 mm).
(2) Junction to end-caps.
(3) This package outline is inactive for new design (see 6.6.1 and 6.6.3).

1.5 Part or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-19500, and as specified herein. See 6.4 for PIN construction example and 6.5 for a list of available PINs, and 6.6 for supersession information.

1.5.1 JAN certification mark and quality level.

1.5.1.1 Quality level designators for encapsulated devices. The quality level designators for encapsulated devices that are applicable for this specification sheet from the lowest to the highest level are as follows: "JAN", "JANTX", and "JANTXV".

1.5.1.2 Quality level designators for unencapsulated devices (die). The quality level designators for unencapsulated devices that are applicable for this specification sheet is "JANHC".

1.5.2 Device type. The designation system for the devices covered by this specification sheet is as follows.

1.5.2.1 First number and first letter symbols. The devices of this specification sheet use the first number and letter symbols "1N".

1.5.2.2 Second number symbols. The second number symbols for the devices covered by this specification sheet are as follows:

3016	3021	3026	3031	3036	3041	3046	3051	
3017	3022	3027	3032	3037	3042	3047	3821	3825
3018	3023	3028	3033	3038	3043	3048	3822	3826
3019	3024	3029	3034	3039	3044	3049	3823	3827
3020	3025	3030	3035	3040	3045	3050	3824	3828

1.5.3 Suffix symbols. The following suffix symbol(s) are incorporated into the PINs for this specification sheet.

1.5.3.1 Voltage tolerance. All devices covered by this specification sheet use a suffix symbol to designate the voltage tolerance of the device as follows.

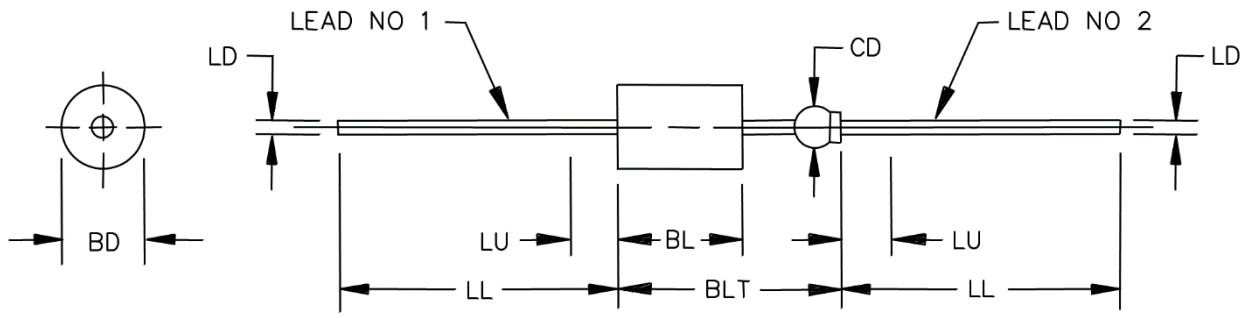
A	Indicates a modified version of the diode that have a nominal voltage tolerance of 5 percent over the basic numbered (non-suffix) device range of 3821 through 3828 only.
B	Indicates a modified version of the diode that have a nominal voltage tolerance of 5 percent over the basic numbered (non-suffix) device range of 3016 through 3051 only.
C	Indicates a modified version of the diode that have a nominal voltage tolerance of 2 percent over the basic numbered (non-suffix) device for all types covered by this specification.
D	Indicates a modified version of the diode that have a nominal voltage tolerance of 1 percent over the basic numbered (non-suffix) device for all types covered by this specification.

1.5.3.2 Package designators. The suffix symbols (or lack thereof) that designate the package outline for the devices covered by this specification sheet are as follows.

	A blank package designator identifies that the package is a DO-202AA. This package outline is inactive for new design (see 6.6.1 and 6.6.3).
-1	A dash-one ("-1") designator identifies that the package is a DO-204AL using a metallurgically bonded double plug construction (see 3.4.2.1).
UR-1	A UR dash-one ("UR-1") designator identifies that the package is a DO-213AB surface mount package using a metallurgically bonded double plug construction (see 3.4.2.1).

1.5.4 Lead finish. The lead finishes applicable to this specification sheet are listed on QPDSIS−19500.

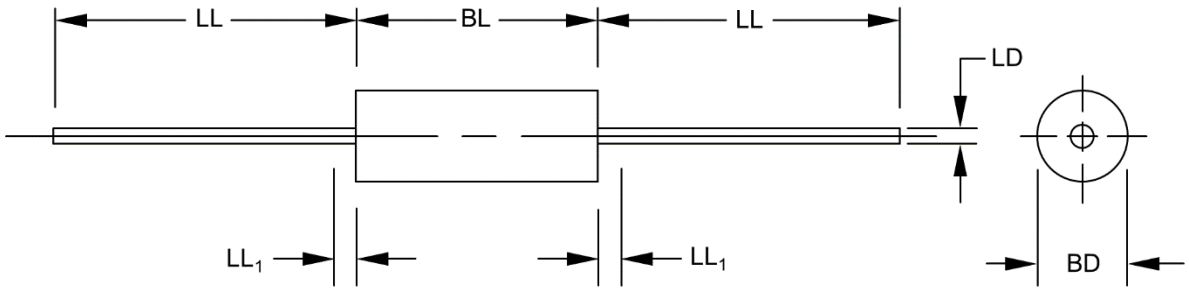
1.5.5 Die identifiers for unencapsulated devices (manufacturers and critical interface identifiers). The manufacturer die identifiers that are applicable for this specification sheet are "A" and "B" (see figures 4, 5 and 6.5.2).



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.215	.235	5.46	5.97	
BL	.293	.357	7.44	9.07	2
BLT		.570		14.48	
CD	.045	.100	1.14	2.54	3
LD	.025	.035	0.64	0.89	
LL	1.000	1.625	25.40	41.28	4
LU		.188		4.78	4

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. The major diameter is essentially constant along its length.
3. Dimension to allow for pinch or seal deformation anywhere along tubulation.
4. Within this zone, diameter may vary to allow for lead finishes and irregularities.
5. The cathode (lead 1) shall be electrically connected to the case.
6. Package DO-202AA is a cavity style construction (see 3.4.2.2).
* 7. In accordance with ASME Y14.5, diameters are equivalent to Øx symbology.

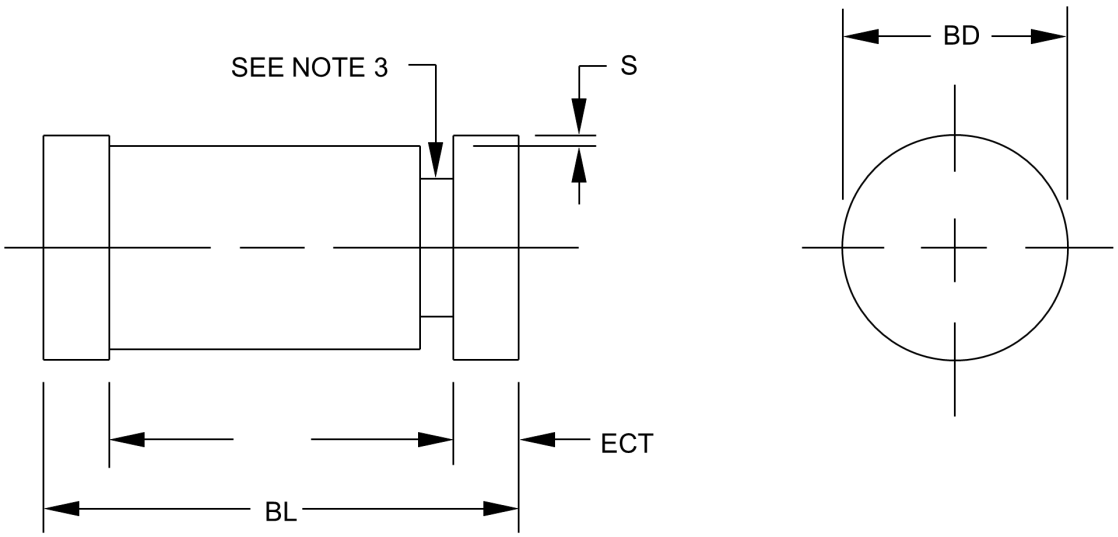
* FIGURE 1. Physical dimensions of axial leaded package DO-202AA (formerly DO-13) (inactive for new design).



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.080	.107	2.03	2.72	2
BL	.160	.205	4.06	5.21	2
LD	.028	.034	0.71	0.86	
LL	1.000		25.40		
LL_1		.50		12.7	3

NOTES:
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
2. Package contour optional within BD and length BL. Heat slugs, if any, shall be included within this cylinder but shall not be subject to minimum limit of BD.
3. Within this zone lead, diameter may vary to allow for lead finishes and irregularities other than heat slugs.
* 4. In accordance with ASME Y14.5, diameters are equivalent to Øx symbology.

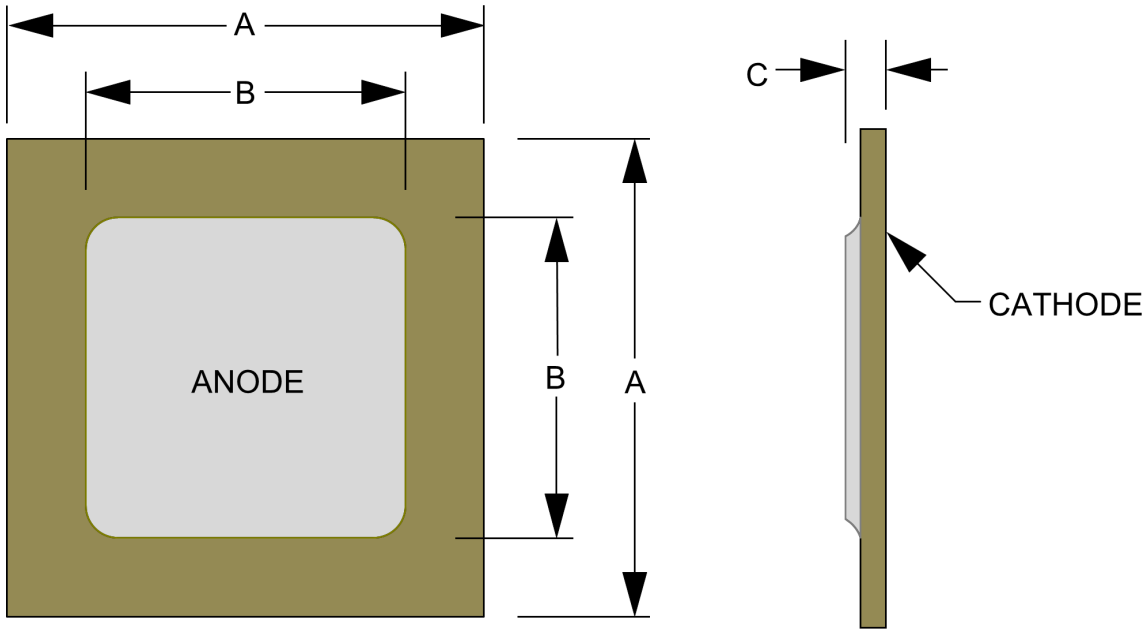
* FIGURE 2. Physical dimensions of axial leaded package DO-204AL (formerly DO-41).



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.094	.105	2.39	2.67
BL_1	.159 (Ref.)		4.04 (Ref.)	
BL	.189	.205	4.80	5.21
ECT	.014	.022	0.360	0.560
S	.001		0.030	

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
* 2. Dimensions are pre-solder dip.
3. Gap not controlled, shape of body and gap not controlled.
* 4. In accordance with ASME Y14.5, diameters are equivalent to Øx symbology.

* FIGURE 3. Physical dimensions of surface mount package DO-213AB.

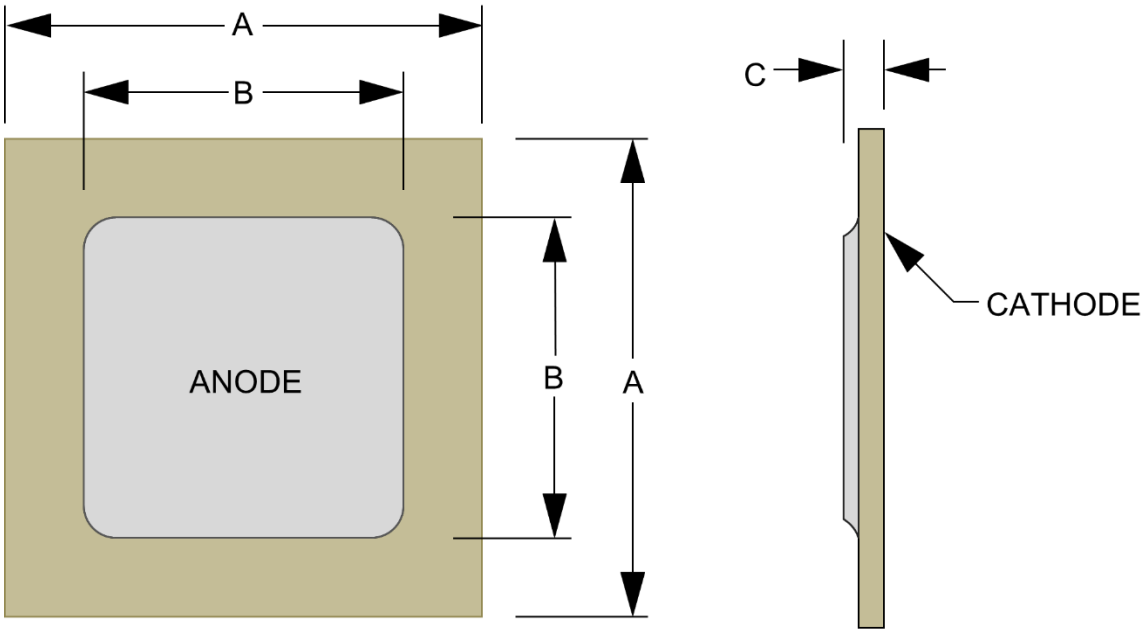


A Version

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.035	.039	0.89	0.99
B	.031	.033	0.79	0.84
* C	.008	.012	0.20	0.30

NOTES:
1. Dimensions are in inches. Millimeter equivalents are given for general information only.
* 2. The metallization characteristics are as follows:
Top (anode) Al
Back (cathode) Au
Al thickness = 25,000Å minimum.
Au thickness = 4,000Å minimum.

* FIGURE 4. Physical dimensions JANHCA die.



B Version

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.035	.039	0.89	0.99
B	.027	.031	0.68	0.79
* C	.010	.014	0.25	0.36

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. The metallization characteristics are as follows:
   Top (anode) Al
   Back (cathode) Au
   Al thickness = 40,000Å minimum,
   Au thickness = 5,000Å minimum.

* FIGURE 5. Physical dimensions JANHCB die.

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 of 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 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 https://quicksearch.dla.mil.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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 manufacturer's list (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500 and herein (see 6.8).

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 (DO-202AA), 2 (DO-204AL), 3 (DO-213AB), and figures 4 and 5 for JANHC.

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

3.4.2 Diode construction. All devices shall be in accordance with the requirements of MIL-PRF-19500 and as specified herein.

3.4.2.1 Dash-one construction. Both axial and surface mount diodes with a dash-one (-1) or UR dash-one (UR-1) suffix in the PIN shall be of a metallurgically bonded double plug construction. The metallurgical bond shall be in accordance with category I, II, and III of MIL-PRF-19500.

3.4.2.2 Non-dash-one construction. Non-dash-one diodes in a DO-202AA package are of a cavity style construction. All verifications applicable to cavity devices shall apply.

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

3.5.1 Marking of surface mount devices. For suffix UR dash-one (UR-1) surface mount devices only, all marking (except polarity) may be omitted from the body, but shall be retained on the initial container.

3.5.2 Polarity. For dash-one (-1) or UR dash-one (UR-1), the polarity shall be indicated with a contrasting color band to denote the cathode end or alternately with a minimum of three contrasting color dots spaced evenly around the periphery at the cathode end.

3.6 Selection of tight tolerance devices. The suffix "C" and "D" voltage tolerance devices shall be selected from JAN, JANTX, or JANTXV devices which have successfully completed all applicable screening, and groups A, B, and C testing as five (5) percent voltage tolerance devices. All sublots of suffix "C" and "D" voltage tolerance devices shall pass subgroup 2 of table I herein, at tighter tolerances. Tighter tolerances for mounting clip temperature shall be maintained for reference purpose to establish correlation. For suffix "C" and "D" voltage tolerance devices, T_L = 30 ±2°C at .375 inches (9.53 mm) from body or equivalent, or zero inches for surface mount devices or equivalent.

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

3.8 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3 (see tables I, II, and III herein).

3.9 Maximum and primary test ratings. The maximum and primary characteristics test ratings for voltage regulator diodes shall be as specified in table III herein.

3.10 Workmanship. 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).

* d. Element evaluation of un-encapsulated die (see 4.6).

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

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

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

4.2.3 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.

4.2.4 JANHC devices. JANHC devices shall be qualified in accordance with MIL-PRF-19500.

* 4.3 Screening of encapsulated devices (quality levels JAN, JANTX and JANTXV only). Screening shall be in accordance with table E-IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with tables I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen	Measurement
	Quality levels JANTX and JANTXV
3a	Temperature cycling
* 3c (1)	Thermal impedance (see 4.3.2)
7a	Not applicable
7b	Optional
9	Not applicable
11	I_{R1} and V_Z
* 12	See 4.3.3
13 (2)	Subgroup 2 of table I herein. ΔI_{R1} ≤ 100 percent of initial reading or 50nA dc, whichever is greater, ΔV_Z ≤ ±2 percent of initial reading.
14a	Applies to DO-202AA devices only.
14b (3)	Required

(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. (Applicable to suffix "-1" and "UR-1" devices only).
(2) PDA = 5 percent for screen 13, applies to ΔI_{R1}, ΔV_Z. Thermal impedance ($Z_{\theta JX}$) is not required in screen 13.
(3) For clear glass diodes, the hermetic seal (gross leak) may be performed at anytime after temperature cycling.

* 4.3.1 JAN testing. Temperature cycling and thermal impedance testing shall be performed in accordance with JANTX requirements.

* 4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with test methods 3101 or 4081 of MIL-STD-750, as applicable, using the guidelines in that method for determining I_M, I_H, t_H, t_{SW} (V_C and V_H where appropriate). See subgroup 4 of table II herein.

* 4.3.3 Power burn-in conditions. Power burn-in conditions shall be as follows (see 4.5.7): $I_{Z(min)}$ = column 7 of table III; T_A = 75°C maximum. Test conditions in accordance with test method 1038 of MIL-STD-750, condition B. Adjust I_Z or T_A to achieve the required T_J. T_J = 125°C minimum. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, T_J, mounting conditions) may be used for JANTX and JANTXV quality levels. A justification demonstrating equivalence is required. In addition, the manufacturing site's burn-in data and performance history will be essential criteria for burn-in modification approval.

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 table E-V of 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 E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (end-points) shall be in accordance with subgroups 2 and 4 of table I herein.

Subgroup	Method	Condition
B2	1051	-55°C to +175°C, 25 cycles.
B2	4066	See 4.5.2.
B3	1027	$I_Z = I_{ZM}$ column 7 of table III (min); adjust I_Z or T_A to achieve T_J = 150°C minimum.
B4	2101	Decap analysis scribe and break only.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table E-VII of MIL-PRF-19500, and as follows. Electrical measurements (end-points) shall be in accordance with subgroups 2 and 4 of table I herein.

Subgroup	Method	Condition
C2	2036	Terminal strength: Test condition A; For DO-204AL, weight = 12 lbs (5.44 Kg), t = 15 seconds; For DO-202AA, weight = 10 lbs (4.53 Kg), t = 15 seconds.
C2	2036	Terminal strength: Test condition E. Shall be performed on all package types except UR-1 devices.
C3		Applies to DO-202AA devices only.
C5	4081	See 4.5.8.
C6	1026	$I_Z = I_{ZM}$ column 7 of table III (min); adjust I_Z or T_A to achieve T_J = 150°C minimum.
C8	4071	Temperature coefficient of regulator voltage (see 4.5.5) $I_Z = I_Z$ column 4 of table III; T_{ref} = +25°C ±3°C; $T_{test} = T_{ref}$ +100°C; α_{vz} = columns 14 and 15 of table III; 22 devices, c = 0.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows. Unless otherwise specified herein, all inspections shall be made at a T_C of 25°C ±3°C.

4.5.1 DC intermittent operation life. The DC intermittent operation life test shall be performed in accordance with test method 1037 of MIL-STD-750, except that the procedure shall be as follows: A cycle shall consist of an "on" period, when forward current is applied suddenly, not gradually, to the device for the time necessary to achieve an increase (delta) case temperature of +85°C +15°C, -5°C followed by an "off" period, when the current is suddenly removed for cooling the case through a similar delta temperature. Auxiliary (forced) cooling is permitted during the "off" period only. Forward current and "on" time, within specific limits, and "off" time may be adjusted to achieve the delta case temperature. Heat sinks shall only be used, if and to the degree necessary, to maintain test samples within the desired delta temperature tolerance. The heating time shall be such that 30 s ≤ $t_{heating}$ ≤ 180 s. The forward current may be steady-state dc, full-wave rectified dc, or the equivalent half-sine wave dc of the specified value. Alternately, I_{ZT} may be used to achieve heating. The test duration shall be the specified number of cycles specified. Within the time interval of 50 cycles before and 500 cycles after the termination of the test, the sample units shall be removed from the specified test conditions and allowed to reach room ambient conditions. Specified end-point measurements for qualification and conformance inspections shall be completed within 96 hours after removal of sample units from the specified test conditions. Additional readings may be taken at the discretion of the manufacturer.

4.5.2 Maximum zener surge current (I_{ZSM}). The maximum zener surge current test shall be performed in accordance with condition B of test method 4066 of MIL-STD-750. I_{ZSM} (see column 9 of table III) shall be applied in the reverse direction and shall be superimposed on I_{ZT} (see column 4 of table III) a total of five (5) surges at 1 minute intervals. Each individual surge shall be a one-half square wave pulse of 1/120 second duration or a one-half sine wave with the same effective (rms) current.

4.5.3 Regulator voltage (V_Z) measurements. The regulator voltage test shall be performed in accordance with test method 4022 of MIL-STD-750. I_{ZT} (see column 4 of table III) shall be applied until thermal equilibrium is attained (90 seconds maximum) prior to reading the breakdown voltage. For this test, the surface mount device shall be mounted at the end-caps and the axial leaded device shall be suspended by its leads with mounting clips whose inside edge is located at .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.

4.5.4 Reverse current (I_R). The reverse current leakage test shall be performed in accordance with the DC method of test method 4016 of MIL-STD-750. The specified reverse voltage shall be applied to the terminals and the reverse current measured.

4.5.5 Temperature coefficient of regulator voltage (α_{vz}). The temperature coefficient of regulator voltage test shall be performed in accordance with test method 4071 of MIL-STD-750. The device shall be temperature stabilized with current applied prior to reading regulator voltage at the specified ambient temperature as specified in 4.4.3, subgroup C8.

4.5.6 Voltage regulation ($V_{Z(reg)}$). Voltage regulation shall be determined by the difference of the regulator voltage measured at different currents as specified in subgroup 7 of table I herein. Both tests shall be performed at thermal equilibrium. This α_{vz} shall not exceed column 8 of table III herein.

* 4.5.7 Free air burn-in and life tests. The use of a current limiting or ballast resistor is permitted provided that each device under test still sees the $I_{Z(min)}$ described in 4.3.3 and that the minimum applied voltage, where applicable, is maintained through-out the burn-in period. Use test method 3100 of MIL-STD-750 to measure T_J.

4.5.8 Thermal resistance. Thermal resistance measurement shall be in accordance with test method 4081 of MIL-STD-750 using the guidelines in that method for determining I_M, I_H, and t_H. See MIL-STD-750, table E-IX, subgroup 4. Forced moving air or draft shall not be permitted across the device during test.

* 4.6 Element evaluation of un-encapsulated die. The element evaluation of un-encapsulated 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. Burn-in duration for the JANKC level follows JANS requirements; the JANHC follows JANTX requirements.

* 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	Condition A; I_F = 200 mA dc.	V_F		1.2	V dc
* Reverse current (see 4.5.4)	4016	Condition A or B; V_R = column 10 of table III.	I_{R1}		Col. 11	µA dc
Regulator voltage (see 4.5.3)	4022	I_{Z1} = I_{ZT} = column 4 of table III.	V_Z	Col. 2	Col. 3	V dc
* Thermal impedance	3101	See 4.3.2 (-1 and UR-1 devices only).	$Z_{\theta JX}$			°C/W
Subgroup 3						
High-temperature operation		T_A = +150°C.				
* Reverse current (-1 device only) (see 4.5.4)	4016	Condition A or B; V_R = column 10 of table III.	I_{R2}		Col. 13	µA dc
Subgroup 4						
Small-signal reverse breakdown impedance	4051	I_{ZT} = column 4 of table III. Isig =10 percent of I_{ZT}.	Z_{ZT}		Col. 5	ohms
Small-signal knee impedance	4051	I_{ZK} = column 16 of table III. I_{sig} =10 percent of I_{ZK}.	Z_{ZK}		Col. 6	ohms
Subgroups 5 and 6						
Not applicable						
Subgroup 7						
Voltage regulation (see 4.5.6)		I_Z = 10 percent of column 7 of table III herein (current 1). I_Z = 50 percent of column 7 of table III herein (current 2).	$V_{Z(reg)}$		Col. 8	V dc

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

* TABLE II. Group E inspection (all quality levels) for qualification and requalification only.

* Inspection 1/	MIL-STD-750		Sample plan
	Method	Conditions	
Subgroup 1			n = 45, c = 0
Temperature cycling	1051	500 cycles.	
Thermal shock	1056	500 cycles.	
Hermetic seal	1071		
Electrical measurements		See subgroups 2 and 4 of table I herein.	
Subgroup 2			n = 45, c = 0
Intermittent operation life	1037	6,000 cycles, see 4.5.1.	
Electrical measurements		See subgroups 2 and 4 of table I herein.	
Subgroup 3			n = 3, c = 0
Decap analysis	2101	Cross section or scribe and break. Separate samples shall be used for each test.	
Subgroup 4			
* Thermal impedance curves		See MIL-PRF-19500. Required for -1 and UR-1 devices only.	
Subgroup 5 and 6			
Not applicable			
Subgroup 8			
* Resistance to glass cracking	1057	Required for -1 devices only. Condition B. Cool down after solder immersion is permitted. Test until failure occurs on all devices with the chosen sample or to a maximum of 25 cycles, whichever comes first.	45 devices

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

TABLE III. Characteristics and test ratings for diodes types 1N3821A through 1N3828A and 1N3016B through 1N3051B (5 percent tolerance).

Voltage Group 1/ 2/	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11		Col 12		Col 13	Col 14	Col 15	Col 16
	V_Z Nom 2/	V_Z Min 2/	V_Z Max 2/	I_{ZT}	Z_{ZT}	Z_{ZK}	I_{ZM}	$V_{Z(reg)}$	I_{ZSM} 3/	V_R	I_{R1} non -1	I_{R1} -1	I_{R3} non -1	I_{R3} -1	I_{R2} (-1 only) 4/	α_{vz} Min	α_{vz} Max	I_{ZK}
	Volts	Volts	Volts	mA	ohms	ohms	mA	Volts	mA	Volts	µA	µA	µA	µA	µA	%/°C	%/°C	mA
1N3821A	3.3	3.14	3.46	76	10	400	276	1.00	1380	1	100	100	200	150	200	-0.075		1.0
1N3822A	3.6	3.42	3.78	69	10	400	252	0.80	1260	1	100	75	200	100	150	-0.07		1.0
1N3823A	3.9	3.71	4.09	64	9	400	238	0.75	1190	1	50	25	100	40	100	-0.06		1.0
1N3824A	4.3	4.09	4.51	58	9	400	213	0.70	1070	1	10	5	20	10	50	-0.05		1.0
1N3825A	4.7	4.47	4.93	53	8	500	194	0.60	970	1	10	5	20	10	50	-0.025	0.027	1.0
1N3826A	5.1	4.85	5.35	49	7	550	178	0.50	890	1	10	3	20	6	50	-0.03	0.032	1.0
1N3827A	5.6	5.32	5.88	45	5	600	162	0.40	810	2	10	3	20	6	50		0.043	1.0
1N3828A	6.2	5.89	6.51	41	2	700	146	0.30	730	3	10	3	20	6	50		0.054	1.0
1N3016B	6.8	6.46	7.14	37	3.5	700	140	0.30	740	5.2	150	5.0	300	10	50		0.061	1.00
1N3017B	7.5	7.13	7.87	34	4.0	700	125	0.35	680	5.7	100	5.0	200	10	50		0.065	0.50
1N3018B	8.2	7.79	8.61	31	4.5	700	115	0.40	600	6.2	50	5.0	100	10	50		0.070	0.50
1N3019B	9.1	8.65	9.55	28	6.0	700	105	0.45	540	6.9	25	5.0	50	10	50		0.073	0.50
1N3020B	10	9.5	10.5	25	7	700	95	0.50	480	7.6	25	5.0	50	10	50		0.076	0.25
1N3021B	11	10.45	11.55	23	8	700	85	0.55	420	8.4	10	1.0	20	4	10		0.078	0.25
1N3022B	12	11.40	12.60	21	9	700	80	0.60	400	9.1	10	1.0	20	4	10		0.081	0.25
1N3023B	13	12.35	13.65	19	10	700	74	0.65	370	9.9	10	0.5	20	2	10		0.085	0.25
1N3024B	15	14.25	15.75	17	14	700	63	0.75	320	11.4	10	0.5	20	2	10		0.088	0.25
1N3025B	16	15.20	16.80	15.5	16	700	60	0.80	300	12.2	10	0.5	20	2	10		0.089	0.25
1N3026B	18	17.10	18.90	14.0	20	750	52	0.83	260	13.7	10	0.5	20	2	10		0.091	0.25
1N3027B	20	19.0	21.0	12.5	22	750	47	0.95	240	15.2	10	0.5	20	2	10		0.092	0.25
1N3028B	22	20.9	23.1	11.5	23	750	43	1.0	210	16.7	10	0.5	20	2	10		0.093	0.25
1N3029B	24	22.8	25.2	10.5	25	750	40	1.1	200	18.2	10	0.5	20	2	10		0.094	0.25
1N3030B	27	25.7	28.3	9.5	35	750	34	1.3	170	20.6	10	0.5	20	2	10		0.096	0.25
1N3031B	30	28.5	31.5	8.5	40	1000	31	1.4	160	22.8	10	0.5	20	2	10		0.098	0.25
1N3032B	33	31.4	34.6	7.5	45	1000	28	1.5	150	25.1	10	0.5	20	2	10		0.099	0.25
1N3033B	36	34.2	37.8	7.0	50	1000	26	1.7	130	27.4	10	0.5	20	2	10		0.100	0.25

See footnotes at end of table.

TABLE III. Characteristics and test ratings for diodes types 1N3821A through 1N3828A and 1N3016B through 1N3051B (5 percent tolerance) − Continued.

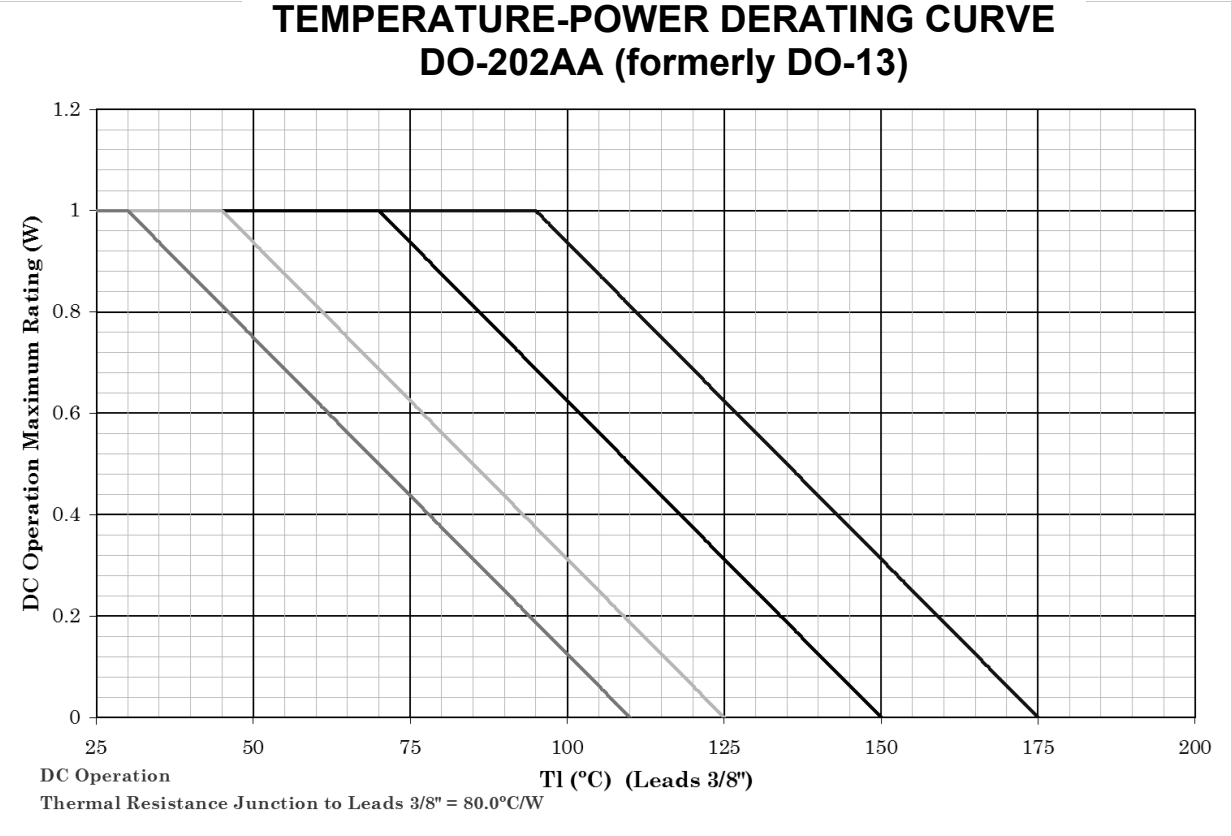
Voltage Group 1/ 2/	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11		Col 12		Col 13	Col 14	Col 15	Col 16
	V_Z Nom 2/	V_Z Min 2/	V_Z Max 2/	I_{ZT}	Z_{ZT}	Z_{ZK}	I_{ZM}	$V_{Z(reg)}$	I_{ZSM} 3/	V_R	I_{R1} non -1	I_{R1} -1	I_{R3} non -1	I_{R3} -1	I_{R2} (-1 only) 4/	α_{vz} Min	α_{vz} Max	I_{ZK}
	Volts	Volts	Volts	mA	ohms	ohms	mA	Volts	mA	Volts	µA	µA	µA	µA	µA	%/°C	%/°C	mA
1N3034B	39	37.1	40.9	6.5	60	1000	23	1.8	110	29.7	10	0.5	20	2	10		0.101	0.25
1N3035B	43	40.9	45.1	6.0	70	1500	21	1.9	100	32.7	10	0.5	20	2	10		0.102	0.25
1N3036B	47	44.7	49.3	5.5	80	1500	19	2.1	95	35.8	10	0.5	20	2	10		0.102	0.25
1N3037B	51	48.5	53.5	5.0	95	1500	18	2.3	90	38.8	10	0.5	20	2	10		0.103	0.25
1N3038B	56	53.2	58.8	4.5	110	2000	17	2.5	85	42.6	10	0.5	20	2	10		0.103	0.25
1N3039B	62	58.95	65.1	4.0	125	2000	15	2.7	75	47.1	10	0.5	20	2	10		0.104	0.25
1N3040B	68	64.60	71.4	3.7	150	2000	14	3.0	70	51.7	10	0.5	20	2	10		0.104	0.25
1N3041B	75	71.35	78.7	3.3	175	2000	12	3.3	63	56.0	10	0.5	20	2	10		0.105	0.25
1N3042B	82	77.95	86.1	3.0	200	3000	11	3.6	58	62.2	10	0.5	20	2	10		0.106	0.25
1N3043B	91	86.5	95.5	2.8	250	3000	10	4.0	50	69.2	10	0.5	20	2	10		0.108	0.25
1N3044B	100	95.0	105.0	2.5	350	3000	9	4.4	45	76.0	10	0.5	20	2	10		0.11	0.25
1N3045B	110	104.5	115.5	2.3	450	4000	8.3	5.0	42	83.6	10	0.5	20	2	10		0.11	0.25
1N3046B	120	114	126	2.0	550	4500	8.0	5.5	40	91.2	10	0.5	20	2	10		0.11	0.25
1N3047B	130	123.5	136.5	1.9	700	5000	6.9	6.0	35	98.8	10	0.5	20	2	10		0.11	0.25
1N3048B	150	142.5	157.5	1.7	1000	6000	5.7	7.0	29	114.0	10	0.5	20	2	10		0.11	0.25
1N3049B	160	152	168	1.6	1100	6500	5.4	8.0	27	121.6	10	0.5	20	2	10		0.11	0.25
1N3050B	180	171	189	1.4	1200	7000	4.9	10.0	25	136.8	10	0.5	20	2	10		0.11	0.25
1N3051B	200	190	210	1.2	1500	8000	4.6	12.0	23	152.0	10	0.5	20	2	10		0.11	0.25

1/ Ratings also apply to dash-one (suffix -1) and surface mount (suffix UR-1) devices unless otherwise noted. The non-dash-one PINs are inactive for new design (see 6.6.1).

2/ All types listed (suffix "A" or "B") are for 5 percent voltage tolerance.
For 2 percent tolerance (suffix "C" and JANHC only), column 2 would be recalculated as 2 percent less than column 1, column 3 would be recalculated as 2 percent more than column 1.
For 1 percent tolerance (suffix "D" and JANHC only), column 2 would be recalculated as 1 percent less than column 1, column 3 would be recalculated as 1 percent more than column 1.

3/ T_A = +25°C.

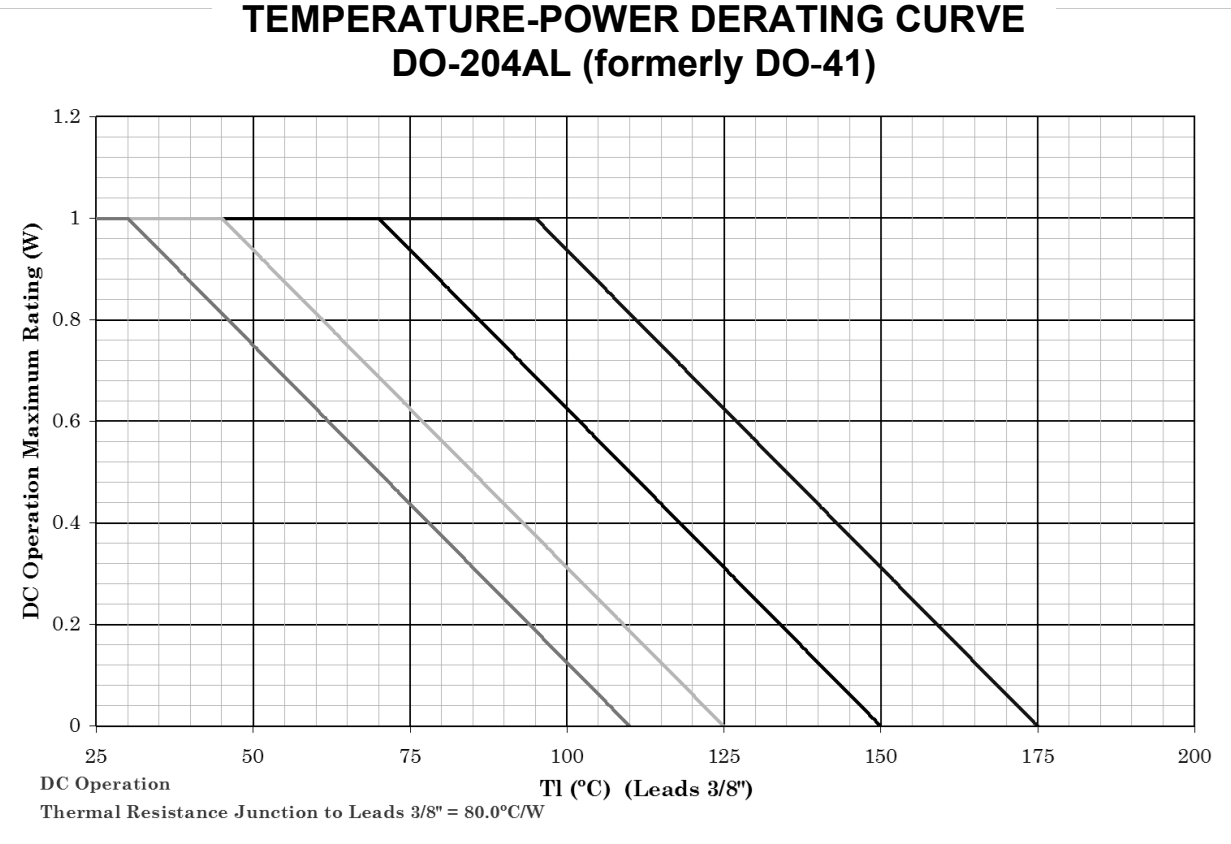
4/ T_A = +150°C.



NOTES:

1. All devices are capable of operating at ≤ T_J specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature (T_J ≤ 175°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ 150°C, where the maximum temperature of electrical test is performed.
4. Derate design curve chosen at T_J ≤ 125°C, and 110°C to show power rating where most users want to limit T_J in their application.

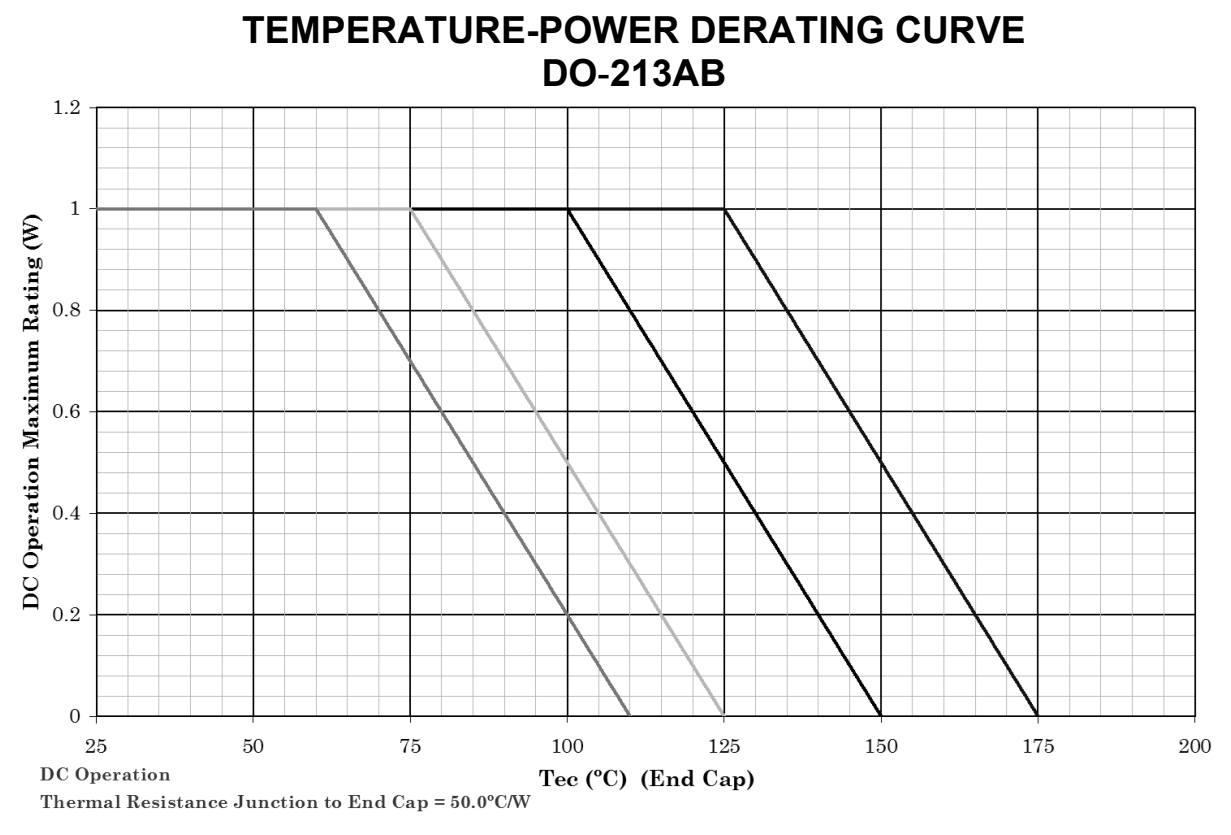
FIGURE 6. Temperature-power derating curve for DO-202AA (formerly DO-13) package.



NOTES:

1. All devices are capable of operating at ≤ T_J specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature (T_J ≤ 175°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ 150°C, where the maximum temperature of electrical test is performed.
4. Derate design curve chosen at T_J ≤ 125°C, and 110°C to show power rating where most users want to limit T_J in their application.

FIGURE 7. Temperature-power derating curve for DO-204AL (formerly DO-41) package.



NOTES:

1. All devices are capable of operating at ≤ T_J specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. Derate design curve constrained by the maximum junction temperature (T_J ≤ 175°C) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at T_J ≤ 150°C, where the maximum temperature of electrical test is performed.
4. Derate design curve chosen at T_J ≤ 125°C, and 110°C to show power rating where most users want to limit T_J in their application.

FIGURE 8. Temperature-power derating curve for DO-213AB package.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Packaging requirements (see 5.1).

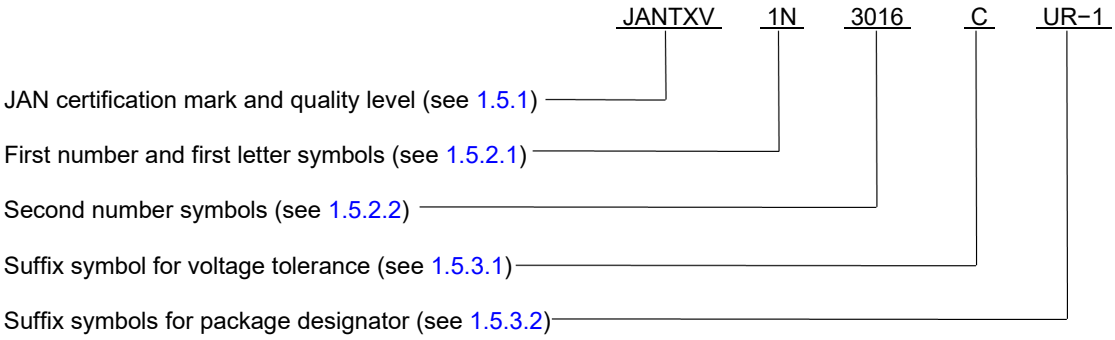
c. Lead finish (see 3.4.1).

d. The complete PIN, see 1.5 and 6.4.

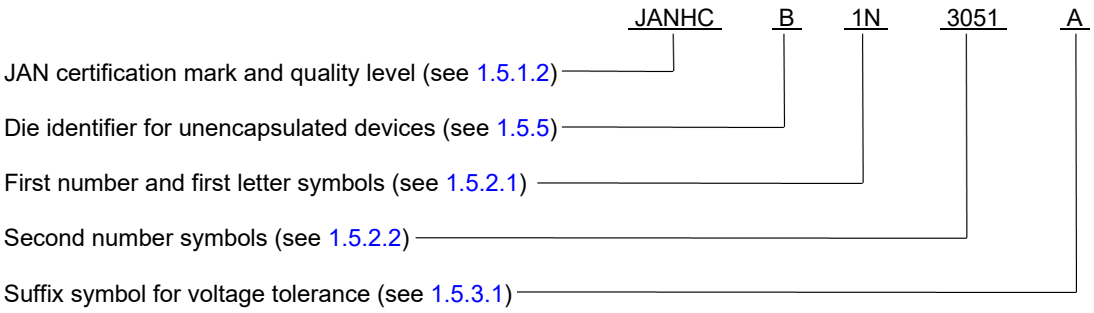
* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention 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 DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://qpldocs.dla.mil.

6.4 PIN construction example. The PINs for encapsulated and unencapsulated devices and are constructed using the following forms.

6.4.1 Encapsulated devices The PINs for encapsulated devices are constructed using the following form.



6.4.2 Unencapsulated devices. The PINs for unencapsulated devices are constructed using the following form.



6.5 List of PINs.

6.5.1 Encapsulated devices. The following is a list of possible PINs for types available for encapsulated devices covered by this specification sheet. The pound sign "#" is a place holder digit for the voltage tolerance suffix symbol.

JAN level "-1"	JANTX level "-1"	JANTXV level "-1"	JAN level "UR-1"	JANTX level "UR-1"	JANTXV level "UR-1"
JAN1N3821#-1	JANTX1N3821#-1	JANTXV1N3821#-1	JAN1N3821#UR-1	JANTX1N3821#UR-1	JANTXV1N3821#UR-1
JAN1N3822#-1	JANTX1N3822#-1	JANTXV1N3822#-1	JAN1N3822#UR-1	JANTX1N3822#UR-1	JANTXV1N3822#UR-1
JAN1N3823#-1	JANTX1N3823#-1	JANTXV1N3823#-1	JAN1N3823#UR-1	JANTX1N3823#UR-1	JANTXV1N3823#UR-1
JAN1N3824#-1	JANTX1N3824#-1	JANTXV1N3824#-1	JAN1N3824#UR-1	JANTX1N3824#UR-1	JANTXV1N3824#UR-1
JAN1N3825#-1	JANTX1N3825#-1	JANTXV1N3825#-1	JAN1N3825#UR-1	JANTX1N3825#UR-1	JANTXV1N3825#UR-1
JAN1N3826#-1	JANTX1N3826#-1	JANTXV1N3826#-1	JAN1N3826#UR-1	JANTX1N3826#UR-1	JANTXV1N3826#UR-1
JAN1N3827#-1	JANTX1N3827#-1	JANTXV1N3827#-1	JAN1N3827#UR-1	JANTX1N3827#UR-1	JANTXV1N3827#UR-1
JAN1N3828#-1	JANTX1N3828#-1	JANTXV1N3828#-1	JAN1N3828#UR-1	JANTX1N3828#UR-1	JANTXV1N3828#UR-1
JAN1N3016#-1	JANTX1N3016#-1	JANTXV1N3016#-1	JAN1N3016#UR-1	JANTX1N3016#UR-1	JANTXV1N3016#UR-1
JAN1N3017#-1	JANTX1N3017#-1	JANTXV1N3017#-1	JAN1N3017#UR-1	JANTX1N3017#UR-1	JANTXV1N3017#UR-1
JAN1N3018#-1	JANTX1N3018#-1	JANTXV1N3018#-1	JAN1N3018#UR-1	JANTX1N3018#UR-1	JANTXV1N3018#UR-1
JAN1N3019#-1	JANTX1N3019#-1	JANTXV1N3019#-1	JAN1N3019#UR-1	JANTX1N3019#UR-1	JANTXV1N3019#UR-1
JAN1N3020#-1	JANTX1N3020#-1	JANTXV1N3020#-1	JAN1N3020#UR-1	JANTX1N3020#UR-1	JANTXV1N3020#UR-1
JAN1N3021#-1	JANTX1N3021#-1	JANTXV1N3021#-1	JAN1N3021#UR-1	JANTX1N3021#UR-1	JANTXV1N3021#UR-1
JAN1N3022#-1	JANTX1N3022#-1	JANTXV1N3022#-1	JAN1N3022#UR-1	JANTX1N3022#UR-1	JANTXV1N3022#UR-1
JAN1N3023#-1	JANTX1N3023#-1	JANTXV1N3023#-1	JAN1N3023#UR-1	JANTX1N3023#UR-1	JANTXV1N3023#UR-1
JAN1N3024#-1	JANTX1N3024#-1	JANTXV1N3024#-1	JAN1N3024#UR-1	JANTX1N3024#UR-1	JANTXV1N3024#UR-1
JAN1N3025#-1	JANTX1N3025#-1	JANTXV1N3025#-1	JAN1N3025#UR-1	JANTX1N3025#UR-1	JANTXV1N3025#UR-1
JAN1N3026#-1	JANTX1N3026#-1	JANTXV1N3026#-1	JAN1N3026#UR-1	JANTX1N3026#UR-1	JANTXV1N3026#UR-1
JAN1N3027#-1	JANTX1N3027#-1	JANTXV1N3027#-1	JAN1N3027#UR-1	JANTX1N3027#UR-1	JANTXV1N3027#UR-1
JAN1N3028#-1	JANTX1N3028#-1	JANTXV1N3028#-1	JAN1N3028#UR-1	JANTX1N3028#UR-1	JANTXV1N3028#UR-1
JAN1N3029#-1	JANTX1N3029#-1	JANTXV1N3029#-1	JAN1N3029#UR-1	JANTX1N3029#UR-1	JANTXV1N3029#UR-1
JAN1N3030#-1	JANTX1N3030#-1	JANTXV1N3030#-1	JAN1N3030#UR-1	JANTX1N3030#UR-1	JANTXV1N3030#UR-1
JAN1N3031#-1	JANTX1N3031#-1	JANTXV1N3031#-1	JAN1N3031#UR-1	JANTX1N3031#UR-1	JANTXV1N3031#UR-1
JAN1N3032#-1	JANTX1N3032#-1	JANTXV1N3032#-1	JAN1N3032#UR-1	JANTX1N3032#UR-1	JANTXV1N3032#UR-1
JAN1N3033#-1	JANTX1N3033#-1	JANTXV1N3033#-1	JAN1N3033#UR-1	JANTX1N3033#UR-1	JANTXV1N3033#UR-1
JAN1N3034#-1	JANTX1N3034#-1	JANTXV1N3034#-1	JAN1N3034#UR-1	JANTX1N3034#UR-1	JANTXV1N3034#UR-1
JAN1N3035#-1	JANTX1N3035#-1	JANTXV1N3035#-1	JAN1N3035#UR-1	JANTX1N3035#UR-1	JANTXV1N3035#UR-1
JAN1N3036#-1	JANTX1N3036#-1	JANTXV1N3036#-1	JAN1N3036#UR-1	JANTX1N3036#UR-1	JANTXV1N3036#UR-1
JAN1N3037#-1	JANTX1N3037#-1	JANTXV1N3037#-1	JAN1N3037#UR-1	JANTX1N3037#UR-1	JANTXV1N3037#UR-1
JAN1N3038#-1	JANTX1N3038#-1	JANTXV1N3038#-1	JAN1N3038#UR-1	JANTX1N3038#UR-1	JANTXV1N3038#UR-1
JAN1N3039#-1	JANTX1N3039#-1	JANTXV1N3039#-1	JAN1N3039#UR-1	JANTX1N3039#UR-1	JANTXV1N3039#UR-1

6.5.1 Encapsulated devices - Continued.

JAN level "-1"	JANTX level "-1"	JANTXV level "-1"	JAN level "UR-1"	JANTX level "UR-1"	JANTXV level "UR-1"
JAN1N3040#-1	JANTX1N3040#-1	JANTXV1N3040#-1	JAN1N3040#UR-1	JANTX1N3040#UR-1	JANTXV1N3040#UR-1
JAN1N3041#-1	JANTX1N3041#-1	JANTXV1N3041#-1	JAN1N3041#UR-1	JANTX1N3041#UR-1	JANTXV1N3041#UR-1
JAN1N3042#-1	JANTX1N3042#-1	JANTXV1N3042#-1	JAN1N3042#UR-1	JANTX1N3042#UR-1	JANTXV1N3042#UR-1
JAN1N3043#-1	JANTX1N3043#-1	JANTXV1N3043#-1	JAN1N3043#UR-1	JANTX1N3043#UR-1	JANTXV1N3043#UR-1
JAN1N3044#-1	JANTX1N3044#-1	JANTXV1N3044#-1	JAN1N3044#UR-1	JANTX1N3044#UR-1	JANTXV1N3044#UR-1
JAN1N3045#-1	JANTX1N3045#-1	JANTXV1N3045#-1	JAN1N3045#UR-1	JANTX1N3045#UR-1	JANTXV1N3045#UR-1
JAN1N3046#-1	JANTX1N3046#-1	JANTXV1N3046#-1	JAN1N3046#UR-1	JANTX1N3046#UR-1	JANTXV1N3046#UR-1
JAN1N3047#-1	JANTX1N3047#-1	JANTXV1N3047#-1	JAN1N3047#UR-1	JANTX1N3047#UR-1	JANTXV1N3047#UR-1
JAN1N3048#-1	JANTX1N3048#-1	JANTXV1N3048#-1	JAN1N3048#UR-1	JANTX1N3048#UR-1	JANTXV1N3048#UR-1
JAN1N3049#-1	JANTX1N3049#-1	JANTXV1N3049#-1	JAN1N3049#UR-1	JANTX1N3049#UR-1	JANTXV1N3049#UR-1
JAN1N3050#-1	JANTX1N3050#-1	JANTXV1N3050#-1	JAN1N3050#UR-1	JANTX1N3050#UR-1	JANTXV1N3050#UR-1
JAN1N3051#-1	JANTX1N3051#-1	JANTXV1N3051#-1	JAN1N3051#UR-1	JANTX1N3051#UR-1	JANTXV1N3051#UR-1

6.5.2 Un-encapsulated devices. The following is a list of possible PINs available for un-encapsulated devices covered by this specification sheet.

JANHCA1N3821A	JANHCA1N3825A	JANHCB1N3821A	JANHCB1N3825A
JANHCA1N3822A	JANHCA1N3826A	JANHCB1N3822A	JANHCB1N3826A
JANHCA1N3823A	JANHCA1N3827A	JANHCB1N3823A	JANHCB1N3827A
JANHCA1N3824A	JANHCA1N3828A	JANHCB1N3824A	JANHCB1N3828A
JANHCA1N3016B	JANHCA1N3034B	JANHCB1N3016B	JANHCB1N3034B
JANHCA1N3017B	JANHCA1N3035B	JANHCB1N3017B	JANHCB1N3035B
JANHCA1N3018B	JANHCA1N3036B	JANHCB1N3018B	JANHCB1N3036B
JANHCA1N3019B	JANHCA1N3037B	JANHCB1N3019B	JANHCB1N3037B
JANHCA1N3020B	JANHCA1N3038B	JANHCB1N3020B	JANHCB1N3038B
JANHCA1N3021B	JANHCA1N3039B	JANHCB1N3021B	JANHCB1N3039B
JANHCA1N3022B	JANHCA1N3040B	JANHCB1N3022B	JANHCB1N3040B
JANHCA1N3023B	JANHCA1N3041B	JANHCB1N3023B	JANHCB1N3041B
JANHCA1N3024B	JANHCA1N3042B	JANHCB1N3024B	JANHCB1N3042B
JANHCA1N3025B	JANHCA1N3043B	JANHCB1N3025B	JANHCB1N3043B
JANHCA1N3026B	JANHCA1N3044B	JANHCB1N3026B	JANHCB1N3044B
JANHCA1N3027B	JANHCA1N3045B	JANHCB1N3027B	JANHCB1N3045B
JANHCA1N3028B	JANHCA1N3046B	JANHCB1N3028B	JANHCB1N3046B
JANHCA1N3029B	JANHCA1N3047B	JANHCB1N3029B	JANHCB1N3047B
JANHCA1N3030B	JANHCA1N3048B	JANHCB1N3030B	JANHCB1N3048B
JANHCA1N3031B	JANHCA1N3049B	JANHCB1N3031B	JANHCB1N3049B
JANHCA1N3032B	JANHCA1N3050B	JANHCB1N3032B	JANHCB1N3050B
JANHCA1N3033B	JANHCA1N3051B	JANHCB1N3033B	JANHCB1N3051B

6.6 Substitution information.

6.6.1 Inactive for new design. The encapsulated non-dash-one device types covered by this document are inactive for new design as of 5 July 2006. The corresponding unencapsulated device types (JANHC) are still active for new design.

6.6.2 Substitutability of 2 percent and 1 percent tolerance devices. Devices of tighter tolerance are a direct one-way substitute for the devices of looser tolerance. Example: JANTX1N3821D-1 is an acceptable substitute for JANTX1N3821A-1.

* 6.6.3 Substitutability of dash-one parts. The non-dash-one devices specified in this document are inactive for new design. Users are cautioned that the replacement dash-one (-1) design is not form, fit, or functionally interchangeable. For new designs, the user should use the dash-one version of the device. For sustainment purposes the users should evaluate the device for use in their application. The following table should be used as a reference.

*

Superseded device type	Superseding device type		Superseded device type	Superseding device type		Superseded device type	Superseding device type
1N3821A	1N3821A-1		1N3023B	1N3023B-1		1N3038B	1N3038B-1
1N3822A	1N3822A-1		1N3024B	1N3024B-1		1N3039B	1N3039B-1
1N3823A	1N3823A-1		1N3025B	1N3025B-1		1N3040B	1N3040B-1
1N3824A	1N3824A-1		1N3026B	1N3026B-1		1N3041B	1N3041B-1
1N3825A	1N3825A-1		1N3027B	1N3027B-1		1N3042B	1N3042B-1
1N3826A	1N3826A-1		1N3028B	1N3028B-1		1N3043B	1N3043B-1
1N3827A	1N3827A-1		1N3029B	1N3029B-1		1N3044B	1N3044B-1
1N3828A	1N3828A-1		1N3030B	1N3030B-1		1N3045B	1N3045B-1
1N3016B	1N3016B-1		1N3031B	1N3031B-1		1N3046B	1N3046B-1
1N3017B	1N3017B-1		1N3032B	1N3032B-1		1N3047B	1N3047B-1
1N3018B	1N3018B-1		1N3033B	1N3033B-1		1N3048B	1N3048B-1
1N3019B	1N3019B-1		1N3034B	1N3034B-1		1N3049B	1N3049B-1
1N3020B	1N3020B-1		1N3035B	1N3035B-1		1N3050B	1N3050B-1
1N3021B	1N3021B-1		1N3036B	1N3036B-1		1N3051B	1N3051B-1
1N3022B	1N3022B-1		1N3037B	1N3037B-1			

6.6.4 Manufacturer's part number supersession information. Devices covered by this specification supersedes the manufacturers' and users' part numbers. This information in no way implies that manufacturers' part numbers are suitable as a substitute for the military PIN.

PIN	Manufacturer's CAGE code	Manufacturer's and user's part number
1N3821A	04713	SZM20046H1/H2
1N3822A	04713	SZ11384H3
1N3826A	04713	SZ11384H6, SZ11491H42, SZ2308H
1N3827A	04713	SZM20014H24A, SZM20020H, SZM29001H
1N3828A	04713	SZM20042H2, SZ113848H8
1N3016B	04713	SZM20001H701, SZM20049H, SZ11829H101
1N3017B	04713	SZM20001H702, SZM106H, SZ11829H102
1N3018B	04713	SZM20001H703, SZ11491H3, SZ11829H103
1N3019B	04713	SZM20001H704, SZ12533H4, SZ11829H104
1N3020B	04713	SZM20001H705, SZM20024H, SZ11829H105
1N3021B	04713	SZM20001H706, SZ12533H6, SZ11829H106
1N3022B	04713	SZM20001H707, SZ12533H7, SZ11829H107
1N3023B	04713	SZM20001H708, SZ1661H, SZ11829H108
1N3024B	04713	SZM20074H, SZ12533H9, SZ11829H109
1N3025B	04713	SZM20050H, SZM20052H1, SZ11829H110
1N3026B	04713	SZM20052H2, SZ12533H11, SZ11829H111
1N3027B	04713	SZ11283H, SZ12533H12, SZ11829H112
1N3028B	04713	SZM20041H, SZ12533H13, SZ11829H113
1N3029B	04713	SZ11282H, SZ12382H, SZ11829H114
1N3030B	04713	SZ12988H10, SZ12533H15, SZ11829H115
1N3031B	04713	SZ11491H16, SZ11829H116
1N3032B	04713	SZM20019H, SZ11384H25, SZ11829H117
1N3034B	04713	SZ14307H
1N3036B	04713	SL11829H118
1N3038B	04713	SZ12125H
1N3042B	04713	SZM29000H, SZ12613H
1N3045B	04713	SZM20052H3, SZ10539H, SZ12126H
1N3046B	04713	SZM20038H1
1N3049B	04713	SZ12114H2
1N3051B	04713	SZM20034H, SZM20048H1

6.7 Suppliers of JANHC die. The qualified JANHC suppliers with the applicable letter version (example JANHCA1N3821A) will be identified on the QML.

JANHC ordering information		
Type	Manufacturer CAGE	
	43611	12954
1N3821A through 1N3828A	JANHCA1N3821A through JANHCA1N3828A	JANHCB1N3821A through JANHCB1N3828A
1N3016B through 1N3051B	JANHCA1N3016B through JANHCA1N3051B	JANHCB1N3016B through JANHCB1N3051B

* 6.8 Symbols used in this specification sheet. The following symbols are used in this specification sheet. The definition associated with the symbol should be as defined in MIL-PRF-19500 or herein.

α_{VZ}	Temperature coefficient.
I_F	Forward current, DC value, no alternating component.
I_{R1}	Reverse current.
I_{R2}	Reverse current for suffix −1 devices.
I_{R3}	Reverse current, dc max (after life test).
I_{sig}	Detector signal current.
I_Z	Zener current.
I_{ZK}	Regulator or reference current, dc near breakdown knee.
I_{ZM}	Maximum zener current.
I_{ZSM}	Maximum zener surge current.
I_{ZT}	Zener test current.
P_T	Total power dissipation, all terminals.
$R_{\theta JC}$	Thermal resistance, junction to case.
T_A	Ambient or free air temperature.
T_C	Case temperature.
T_J	Junction temperature.
T_{stg}	Storage temperature.
V_F	Forward voltage.
V_R	Reverse voltage.
V_Z	Regulator voltage.
$V_{Z(reg)}$	Voltage regulation.
Z_Z	Impedance.
Z_{ZK}	Knee impedance.

6.9 Request for new types and configurations. Requests for new device types or configurations for inclusions in this specification sheet should be submitted to: DLA Land and Maritime, ATTN: VAC, Post Office Box 3990, Columbus, OH 43218−3990 or by electronic mail at semiconductor@dla.mil or by facsimile (614) 693-1642 or DSN 850-6939.

6.10 Amendment notations. The margins of this specification are marked with vertical bars to indicate modifications generated by this amendment. 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.

Custodians:
Army − CR
* Navy − SH
Air Force − 85
NASA − NA
DLA − CC

Review activities:
Army − AR, MI, SM
Navy − AS, MC
* Air Force −19

Preparing activity:
DLA − CC

(Project 5961−2022−015)

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