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 $T_C = 25^\circ C$. Maximum ratings are as shown in maximum and primary characteristics and test ratings (see 3.9 herein) and as follows: $-55^\circ C \leq T_J \leq +175^\circ C$; $-55^\circ C \leq T_{stg} \leq +175^\circ C$.

<table>
<thead>
<tr>
<th>Package type</th>
<th>Package style</th>
<th>$P_{IL}$ (1)</th>
<th>$P_{T_{CPU}}$ (1)</th>
<th>$T_L$</th>
<th>$T_{EC}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO-202AA, DO-204AL</td>
<td>Axial</td>
<td>1.0 (2)</td>
<td>1</td>
<td>+95</td>
<td></td>
</tr>
<tr>
<td>DO-213AB</td>
<td>Surface mount (UR)</td>
<td>1.0 (3)</td>
<td></td>
<td></td>
<td>+125</td>
</tr>
</tbody>
</table>

(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 $T_L = +175^\circ C$). (3) Derate to 0 at $T_{EC} = +175^\circ C$.

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.
1.4 **Primary electrical characteristics.** Primary electrical characteristics are as shown in primary test ratings (see 3.9 herein) and as follows: $3.3 \text{ V dc} \leq V_z \leq 200 \text{ V dc}$. 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.

<table>
<thead>
<tr>
<th>Type</th>
<th>$R_{TJL}$ (1)</th>
<th>$R_{TJEC}$ (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO-202AA</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>DO-204AL</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>DO-213AB</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

(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:

<table>
<thead>
<tr>
<th>3016</th>
<th>3021</th>
<th>3026</th>
<th>3031</th>
<th>3036</th>
<th>3041</th>
<th>3046</th>
<th>3051</th>
</tr>
</thead>
<tbody>
<tr>
<td>3017</td>
<td>3022</td>
<td>3027</td>
<td>3032</td>
<td>3037</td>
<td>3042</td>
<td>3047</td>
<td>3821</td>
</tr>
<tr>
<td>3018</td>
<td>3023</td>
<td>3028</td>
<td>3033</td>
<td>3038</td>
<td>3043</td>
<td>3048</td>
<td>3822</td>
</tr>
<tr>
<td>3019</td>
<td>3024</td>
<td>3029</td>
<td>3034</td>
<td>3039</td>
<td>3044</td>
<td>3049</td>
<td>3823</td>
</tr>
<tr>
<td>3020</td>
<td>3025</td>
<td>3030</td>
<td>3035</td>
<td>3040</td>
<td>3045</td>
<td>3050</td>
<td>3824</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>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.</td>
</tr>
<tr>
<td>B</td>
<td>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.</td>
</tr>
<tr>
<td>C</td>
<td>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.</td>
</tr>
<tr>
<td>D</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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).</td>
</tr>
<tr>
<td>−1</td>
<td>A dash-one (&quot;−1&quot;) designator identifies that the package is a DO-204AL using a metallurgically bonded double plug construction (see 3.4.2.1).</td>
</tr>
<tr>
<td>UR−1</td>
<td>A UR dash-one (&quot;UR−1&quot;) designator identifies that the package is a DO-213AB surface mount package using a metallurgically bonded double plug construction (see 3.4.2.1).</td>
</tr>
</tbody>
</table>

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).
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Dimensions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inches</td>
<td>Millimeters</td>
</tr>
<tr>
<td>BD</td>
<td>.215</td>
<td>.235</td>
</tr>
<tr>
<td>BL</td>
<td>.293</td>
<td>.357</td>
</tr>
<tr>
<td>BLT</td>
<td></td>
<td>.570</td>
</tr>
<tr>
<td>CD</td>
<td>.045</td>
<td>.100</td>
</tr>
<tr>
<td>LD</td>
<td>.025</td>
<td>.035</td>
</tr>
<tr>
<td>LL</td>
<td>1.000</td>
<td>1.625</td>
</tr>
<tr>
<td>LU</td>
<td>.188</td>
<td></td>
</tr>
</tbody>
</table>

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 Y14.5M, diameters are equivalent to $\Phi$x symbology.

FIGURE 1. Physical dimensions of axial leaded package DO-202AA (formerly DO-13) (inactive for new design).
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 Y14.5M, diameters are equivalent to $\Phi$ 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 |
| BL₁ | .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. Gap not controlled, shape of body and gap not controlled.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

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

1. Dimensions are in inches. Millimeter equivalents are given for general information only.

3. The physical characteristics of the die thickness are .010 ±.002 (0.25 mm). The metallization characteristics are as follows:
   - Top (anode)  Al
   - Back (cathode)  Au
   - Al thickness = 25,000Å minimum.
   - Au thickness = 4,000Å minimum.

4. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

FIGURE 4. Physical dimensions JANHCA die.
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Dimensions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inches</td>
<td>Millimeters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>A</td>
<td>.035</td>
<td>.039</td>
<td>0.89</td>
</tr>
<tr>
<td>B</td>
<td>.027</td>
<td>.031</td>
<td>0.68</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Dimensions are in inches. Millimeters are given for general information only.
2. The physical characteristics of the die thickness are .012 ±002 (0.30 mm ±0.051 mm). The metallization characteristics are as follows:
   - Top (anode) Al
   - Back (cathode) Au
   - Al thickness = 40,000Å minimum,
   - Au thickness = 5,000Å minimum.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

**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


DEPARTMENT OF DEFENSE STANDARDS


(Copies of these documents are available online at http://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, \( T_L = 30 \pm 2°C \) 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).

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.

4.3.1 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.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a</td>
<td>Temperature cycling</td>
</tr>
<tr>
<td>3c (1)</td>
<td>Thermal impedance (see 4.3.1.2)</td>
</tr>
<tr>
<td>7a</td>
<td>Not applicable</td>
</tr>
<tr>
<td>7b</td>
<td>Optional</td>
</tr>
<tr>
<td>9</td>
<td>Not applicable</td>
</tr>
<tr>
<td>11</td>
<td>$I_{R1}$ and $V_Z$</td>
</tr>
<tr>
<td>12</td>
<td>See 4.3.1.3</td>
</tr>
<tr>
<td>13 (2)</td>
<td>Subgroup 2 of table I herein. $\Delta I_{R1} \leq 100$ percent of initial reading or 50nA dc, whichever is greater $\Delta V_Z \leq \pm 2$ percent of initial reading.</td>
</tr>
<tr>
<td>14a</td>
<td>Applies to DO-202AA devices only</td>
</tr>
<tr>
<td>14b (3)</td>
<td>Required</td>
</tr>
</tbody>
</table>

(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 $\Delta I_{R1}, \Delta V_Z$. 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.

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

4.3.1.2 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 $I_M, I_H, t_H, t_{SW}$ (Vc and Vh where appropriate). See subgroup 4 of table II herein.

4.3.1.3 Power burn-in conditions. Power burn-in conditions shall be as follows (see 4.5.7): $I_{Z\text{min}} = \text{column }7$ of table III; $T_A = 75{\degree}C$ 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 $T_J$. $T_J = 125{\degree}C$ 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.

4.3.2 Screening of unencapsulated die (quality level JANHC). Screening of JANHC die shall be in accordance with MIL-PRF-19500.
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 appendix E, 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.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Method</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2</td>
<td>1051</td>
<td>~55°C to +175°C, 25 cycles.</td>
</tr>
<tr>
<td>B2</td>
<td>4066</td>
<td>See 4.5.2.</td>
</tr>
<tr>
<td>B3</td>
<td>1027</td>
<td>I_Z = I_ZM column 7 of table III (min); adjust I_Z or T_A to achieve T_J = 150°C minimum.</td>
</tr>
<tr>
<td>B4</td>
<td>2101</td>
<td>Decap analysis scribe and break only.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Method</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>2036</td>
<td>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.</td>
</tr>
<tr>
<td>C2</td>
<td>2036</td>
<td>Terminal strength: Test condition E. Shall be performed on all package types except UR-1 devices.</td>
</tr>
<tr>
<td>C3</td>
<td></td>
<td>Applies to DO-202AA devices only.</td>
</tr>
<tr>
<td>C5</td>
<td>4081</td>
<td>See 4.5.8.</td>
</tr>
<tr>
<td>C6</td>
<td>1026</td>
<td>I_Z = I_ZM column 7 of table III (min); adjust I_Z or T_A to achieve T_J = 150°C minimum.</td>
</tr>
<tr>
<td>C8</td>
<td>4071</td>
<td>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.</td>
</tr>
</tbody>
</table>

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 +85ºC +15ºC, –5ºC 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 \( \leq t_{\text{heating}} \leq 180 \text{ s} \). 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 +25ºC +8ºC,–2ºC . 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 (\( \alpha_{VZ} \)). 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 (\( V_Z(\text{reg}) \)). 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 \( \alpha_{VZ} \) 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 4.3.1.3 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 \( I_w \). See MIL-STD-750, table E–IX, subgroup 4. Forced moving air or draft shall not be permitted across the device during test.
TABLE I. Group A inspection.

<table>
<thead>
<tr>
<th>Inspection 1/</th>
<th>MIL-STD-750 Method</th>
<th>Conditions</th>
<th>Symbol</th>
<th>Limits 2/</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subgroup 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual and mechanical examination</td>
<td>2071</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward voltage</td>
<td>4011</td>
<td>Condition A; $I_F = 200 \text{ mA dc.}$</td>
<td>$V_F$</td>
<td>1.2</td>
<td>V dc</td>
</tr>
<tr>
<td>Reverse current (see 4.5.4)</td>
<td>4016</td>
<td>DC method; $V_R = \text{column 10 of table III.}$</td>
<td>$I_{R1}$</td>
<td>Col. 11</td>
<td>$\mu A \text{ dc}$</td>
</tr>
<tr>
<td>Regulator voltage (see 4.5.3)</td>
<td>4022</td>
<td>$I_{Z1} = I_{ZT} = \text{column 4 of table III.}$</td>
<td>$V_Z$</td>
<td>Col. 2</td>
<td>Col. 3</td>
</tr>
<tr>
<td>Thermal impedance</td>
<td>3101</td>
<td>See 4.3.1.2 (–1 and UR–1 devices only).</td>
<td>$Z_{\theta JX}$</td>
<td></td>
<td>°C/W</td>
</tr>
<tr>
<td><strong>Subgroup 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-temperature operation</td>
<td></td>
<td>$T_A = +150^\circ \text{C.}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse current (–1 device only) (see 4.5.4)</td>
<td>4016</td>
<td>DC method; $V_R = \text{column 10 of table III.}$</td>
<td>$I_{R2}$</td>
<td>Col. 13</td>
<td>$\mu A \text{ dc}$</td>
</tr>
<tr>
<td><strong>Subgroup 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small-signal reverse breakdown impedance</td>
<td>4051</td>
<td>$I_{ZT} = \text{column 4 of table III.}$</td>
<td>$Z_{ZT}$</td>
<td>Col. 5</td>
<td>ohms</td>
</tr>
<tr>
<td>Small-signal knee impedance</td>
<td>4051</td>
<td>$I_{ZK} = \text{column 16 of table III.}$</td>
<td>$Z_{ZK}$</td>
<td>Col. 6</td>
<td>ohms</td>
</tr>
<tr>
<td><strong>Subgroups 5 and 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage regulation (see 4.5.6)</td>
<td></td>
<td></td>
<td>$I_Z = 10 \text{ percent of column 7 of table III herein (current 1).}$</td>
<td>$V_{Z(\text{reg})}$</td>
<td>Col. 8</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Inspection 1/</th>
<th>Method</th>
<th>Conditions</th>
<th>Qualification conformance inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subgroup 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature cycling</td>
<td>1051</td>
<td>500 cycles.</td>
<td>n = 45, c = 0</td>
</tr>
<tr>
<td>Thermal shock</td>
<td>1056</td>
<td>500 cycles.</td>
<td></td>
</tr>
<tr>
<td>Hermetic seal</td>
<td>1071</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical measurements</td>
<td></td>
<td>See subgroups 2 and 4 of table I herein.</td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent operation life</td>
<td>1037</td>
<td>6,000 cycles, see 4.5.1.</td>
<td>n = 45, c = 0</td>
</tr>
<tr>
<td>Electrical measurements</td>
<td></td>
<td>See subgroups 2 and 4 of table I herein.</td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decap analysis</td>
<td>2101</td>
<td>Cross section or scribe and break. Separate samples shall be used for each test.</td>
<td>n = 3, c = 0</td>
</tr>
<tr>
<td><strong>Subgroup 4</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal impedance curves (–1 devices and UR–1 only)</td>
<td></td>
<td>See MIL-PRF-19500.</td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 5 and 6</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subgroup 8</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance to glass cracking (–1 devices only)</td>
<td>1057</td>
<td>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.</td>
<td>45 devices</td>
</tr>
</tbody>
</table>

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).

<table>
<thead>
<tr>
<th>Voltage Group</th>
<th>Col 1</th>
<th>Col 2</th>
<th>Col 3</th>
<th>Col 4</th>
<th>Col 5</th>
<th>Col 6</th>
<th>Col 7</th>
<th>Col 8</th>
<th>Col 9</th>
<th>Col 10</th>
<th>Col 11</th>
<th>Col 12</th>
<th>Col 13</th>
<th>Col 14</th>
<th>Col 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1N3821A</td>
<td>3.3</td>
<td>3.14</td>
<td>3.46</td>
<td>76</td>
<td>10</td>
<td>400</td>
<td>276</td>
<td>1.00</td>
<td>1380</td>
<td>1</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>1N3822A</td>
<td>3.6</td>
<td>3.42</td>
<td>3.78</td>
<td>69</td>
<td>10</td>
<td>400</td>
<td>252</td>
<td>0.80</td>
<td>1260</td>
<td>1</td>
<td>100</td>
<td>75</td>
<td>200</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>1N3823A</td>
<td>3.9</td>
<td>3.71</td>
<td>4.09</td>
<td>64</td>
<td>9</td>
<td>400</td>
<td>238</td>
<td>0.75</td>
<td>1190</td>
<td>1</td>
<td>50</td>
<td>25</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>1N3824A</td>
<td>4.3</td>
<td>4.09</td>
<td>4.51</td>
<td>58</td>
<td>9</td>
<td>400</td>
<td>213</td>
<td>0.70</td>
<td>1070</td>
<td>1</td>
<td>10</td>
<td>5</td>
<td>20</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3825A</td>
<td>4.7</td>
<td>4.47</td>
<td>4.93</td>
<td>53</td>
<td>8</td>
<td>500</td>
<td>194</td>
<td>0.60</td>
<td>970</td>
<td>1</td>
<td>10</td>
<td>5</td>
<td>20</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3826A</td>
<td>5.1</td>
<td>4.85</td>
<td>5.35</td>
<td>49</td>
<td>7</td>
<td>550</td>
<td>176</td>
<td>0.50</td>
<td>890</td>
<td>1</td>
<td>10</td>
<td>3</td>
<td>20</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>1N3827A</td>
<td>5.6</td>
<td>5.32</td>
<td>5.88</td>
<td>45</td>
<td>5</td>
<td>600</td>
<td>162</td>
<td>0.40</td>
<td>810</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>20</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>1N3828A</td>
<td>6.2</td>
<td>5.89</td>
<td>6.51</td>
<td>41</td>
<td>2</td>
<td>700</td>
<td>146</td>
<td>0.30</td>
<td>730</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td>20</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>1N3016B</td>
<td>6.8</td>
<td>6.46</td>
<td>7.14</td>
<td>37</td>
<td>3.5</td>
<td>700</td>
<td>140</td>
<td>0.30</td>
<td>740</td>
<td>5.2</td>
<td>150</td>
<td>50</td>
<td>300</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3017B</td>
<td>7.5</td>
<td>7.13</td>
<td>7.87</td>
<td>34</td>
<td>4.0</td>
<td>700</td>
<td>125</td>
<td>0.35</td>
<td>680</td>
<td>5.7</td>
<td>100</td>
<td>50</td>
<td>200</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3018B</td>
<td>8.2</td>
<td>7.79</td>
<td>8.61</td>
<td>31</td>
<td>4.5</td>
<td>700</td>
<td>115</td>
<td>0.40</td>
<td>600</td>
<td>6.2</td>
<td>50</td>
<td>50</td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>1N3019B</td>
<td>9.1</td>
<td>8.65</td>
<td>9.55</td>
<td>28</td>
<td>6.0</td>
<td>700</td>
<td>105</td>
<td>0.45</td>
<td>540</td>
<td>6.9</td>
<td>25</td>
<td>50</td>
<td>50</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3020B</td>
<td>10.9</td>
<td>9.5</td>
<td>10.5</td>
<td>25</td>
<td>7.0</td>
<td>700</td>
<td>95</td>
<td>0.50</td>
<td>480</td>
<td>7.6</td>
<td>25</td>
<td>50</td>
<td>50</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>1N3021B</td>
<td>11.45</td>
<td>11.55</td>
<td>23</td>
<td>8</td>
<td>700</td>
<td>85</td>
<td>0.55</td>
<td>420</td>
<td>8.4</td>
<td>10</td>
<td>1.0</td>
<td>20</td>
<td>4</td>
<td>10</td>
<td>0.078</td>
</tr>
<tr>
<td>1N3022B</td>
<td>12.5</td>
<td>12.60</td>
<td>21</td>
<td>9</td>
<td>700</td>
<td>80</td>
<td>0.60</td>
<td>400</td>
<td>9.1</td>
<td>10</td>
<td>1.0</td>
<td>20</td>
<td>4</td>
<td>10</td>
<td>0.081</td>
</tr>
<tr>
<td>1N3023B</td>
<td>13.25</td>
<td>13.65</td>
<td>19</td>
<td>10</td>
<td>700</td>
<td>74</td>
<td>0.65</td>
<td>370</td>
<td>9.9</td>
<td>10</td>
<td>3</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.085</td>
</tr>
<tr>
<td>1N3024B</td>
<td>15</td>
<td>14.25</td>
<td>15.75</td>
<td>17</td>
<td>14</td>
<td>700</td>
<td>63</td>
<td>0.75</td>
<td>320</td>
<td>11.4</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3025B</td>
<td>16</td>
<td>15.20</td>
<td>16.80</td>
<td>15.6</td>
<td>16</td>
<td>700</td>
<td>68</td>
<td>0.80</td>
<td>300</td>
<td>12.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3026B</td>
<td>18</td>
<td>17.10</td>
<td>18.90</td>
<td>14.0</td>
<td>20</td>
<td>750</td>
<td>52</td>
<td>0.83</td>
<td>260</td>
<td>13.7</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3027B</td>
<td>20</td>
<td>19.0</td>
<td>21.0</td>
<td>12.5</td>
<td>22</td>
<td>750</td>
<td>47</td>
<td>0.95</td>
<td>240</td>
<td>15.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3028B</td>
<td>22</td>
<td>20.9</td>
<td>23.1</td>
<td>11.5</td>
<td>23</td>
<td>750</td>
<td>43</td>
<td>1.0</td>
<td>210</td>
<td>16.7</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3029B</td>
<td>24</td>
<td>22.8</td>
<td>25.2</td>
<td>10.5</td>
<td>25</td>
<td>750</td>
<td>40</td>
<td>1.1</td>
<td>200</td>
<td>18.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3030B</td>
<td>27</td>
<td>25.7</td>
<td>28.3</td>
<td>9.5</td>
<td>35</td>
<td>750</td>
<td>34</td>
<td>1.3</td>
<td>170</td>
<td>20.6</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3031B</td>
<td>30</td>
<td>28.5</td>
<td>31.5</td>
<td>8.5</td>
<td>40</td>
<td>750</td>
<td>31</td>
<td>1.4</td>
<td>160</td>
<td>22.8</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3032B</td>
<td>33</td>
<td>31.4</td>
<td>34.6</td>
<td>7.5</td>
<td>45</td>
<td>1000</td>
<td>28</td>
<td>1.5</td>
<td>150</td>
<td>25.1</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1N3033B</td>
<td>36</td>
<td>34.2</td>
<td>37.8</td>
<td>7.0</td>
<td>50</td>
<td>1000</td>
<td>26</td>
<td>1.7</td>
<td>130</td>
<td>27.4</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Voltage Group</th>
<th>Col 1</th>
<th>Col 2</th>
<th>Col 3</th>
<th>Col 4</th>
<th>Col 5</th>
<th>Col 6</th>
<th>Col 7</th>
<th>Col 8</th>
<th>Col 9</th>
<th>Col 10</th>
<th>Col 11</th>
<th>Col 12</th>
<th>Col 13</th>
<th>Col 14</th>
<th>Col 15</th>
<th>Col 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1N3034B</td>
<td>39/2</td>
<td>37.1/2</td>
<td>40.9/2</td>
<td>6.5</td>
<td>60</td>
<td>1000</td>
<td>23</td>
<td>1.8</td>
<td>110</td>
<td>29.7</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.101</td>
</tr>
<tr>
<td>1N3035B</td>
<td>43/2</td>
<td>40.9/2</td>
<td>45.1/2</td>
<td>6.0</td>
<td>70</td>
<td>1500</td>
<td>21</td>
<td>1.9</td>
<td>100</td>
<td>32.7</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.102</td>
</tr>
<tr>
<td>1N3036B</td>
<td>47/2</td>
<td>44.7/2</td>
<td>49.3/2</td>
<td>5.5</td>
<td>80</td>
<td>1500</td>
<td>19</td>
<td>2.1</td>
<td>95</td>
<td>35.8</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.102</td>
</tr>
<tr>
<td>1N3037B</td>
<td>51/2</td>
<td>48.5/2</td>
<td>53.5/2</td>
<td>5.0</td>
<td>95</td>
<td>1500</td>
<td>18</td>
<td>2.3</td>
<td>90</td>
<td>38.8</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.103</td>
</tr>
<tr>
<td>1N3038B</td>
<td>56/2</td>
<td>53.2/2</td>
<td>58.8/2</td>
<td>4.5</td>
<td>110</td>
<td>2000</td>
<td>17</td>
<td>2.5</td>
<td>85</td>
<td>42.6</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.103</td>
</tr>
<tr>
<td>1N3039B</td>
<td>62/2</td>
<td>58.95/2</td>
<td>65.1/2</td>
<td>4.0</td>
<td>125</td>
<td>2000</td>
<td>15</td>
<td>2.7</td>
<td>75</td>
<td>47.1</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.104</td>
</tr>
<tr>
<td>1N3040B</td>
<td>68/2</td>
<td>64.60/2</td>
<td>71.4/2</td>
<td>3.7</td>
<td>150</td>
<td>2000</td>
<td>14</td>
<td>3.0</td>
<td>70</td>
<td>51.7</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.104</td>
</tr>
<tr>
<td>1N3041B</td>
<td>75/2</td>
<td>71.35/2</td>
<td>78.7/2</td>
<td>3.3</td>
<td>175</td>
<td>2000</td>
<td>12</td>
<td>3.3</td>
<td>63</td>
<td>56.0</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.105</td>
</tr>
<tr>
<td>1N3042B</td>
<td>82/2</td>
<td>77.95/2</td>
<td>86.1/2</td>
<td>3.0</td>
<td>200</td>
<td>3000</td>
<td>11</td>
<td>3.6</td>
<td>58</td>
<td>62.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.106</td>
</tr>
<tr>
<td>1N3043B</td>
<td>91/2</td>
<td>86.5/2</td>
<td>95.5/2</td>
<td>2.8</td>
<td>250</td>
<td>3000</td>
<td>10</td>
<td>4.0</td>
<td>50</td>
<td>69.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.108</td>
</tr>
<tr>
<td>1N3044B</td>
<td>100/2</td>
<td>95.0/2</td>
<td>105.0/2</td>
<td>2.5</td>
<td>350</td>
<td>3000</td>
<td>9</td>
<td>4.4</td>
<td>45</td>
<td>76.0</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3045B</td>
<td>110/2</td>
<td>104.5/2</td>
<td>115.5/2</td>
<td>2.3</td>
<td>450</td>
<td>4000</td>
<td>8.3</td>
<td>5.0</td>
<td>42</td>
<td>83.6</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3046B</td>
<td>120/2</td>
<td>114.1/2</td>
<td>126.0/2</td>
<td>2.0</td>
<td>550</td>
<td>4500</td>
<td>8.0</td>
<td>5.5</td>
<td>40</td>
<td>90.2</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3047B</td>
<td>130/2</td>
<td>123.5/2</td>
<td>136.5/2</td>
<td>1.9</td>
<td>700</td>
<td>5000</td>
<td>6.9</td>
<td>6.0</td>
<td>35</td>
<td>98.8</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3048B</td>
<td>150/2</td>
<td>142.5/2</td>
<td>157.5/2</td>
<td>1.7</td>
<td>1000</td>
<td>6000</td>
<td>5.7</td>
<td>7.0</td>
<td>29</td>
<td>114.0</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3049B</td>
<td>160/2</td>
<td>152/2</td>
<td>168/2</td>
<td>1.6</td>
<td>1100</td>
<td>6500</td>
<td>5.4</td>
<td>8.0</td>
<td>27</td>
<td>121.6</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3050B</td>
<td>180/2</td>
<td>171/2</td>
<td>189/2</td>
<td>1.4</td>
<td>1200</td>
<td>7000</td>
<td>4.9</td>
<td>10.0</td>
<td>25</td>
<td>136.8</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
<tr>
<td>1N3051B</td>
<td>200/2</td>
<td>190/2</td>
<td>210/2</td>
<td>1.2</td>
<td>1500</td>
<td>8000</td>
<td>4.6</td>
<td>12.0</td>
<td>23</td>
<td>152.0</td>
<td>10</td>
<td>0.5</td>
<td>20</td>
<td>2</td>
<td>10</td>
<td>0.11</td>
</tr>
</tbody>
</table>

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/ $T_A = +25^\circ C$.
4/ $T_A = +150^\circ C$. 

MIL-PREC-19500/115P 
WAMENDMENT 1
NOTES:

1. All devices are capable of operating at $\leq T_J$ 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 ($T_J \leq 175^\circ C$) and power rating specified. (See 1.3 herein.)

3. Derate design curve chosen at $T_J \leq 150^\circ C$, where the maximum temperature of electrical test is performed.

4. Derate design curve chosen at $T_J \leq 125^\circ C$, and $110^\circ C$ to show power rating where most users want to limit $T_J$ in their application.

NOTES:
1. All devices are capable of operating at \( \leq T_J \) 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 (\( T_J \leq 175°C \)) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at \( T_J \leq 150°C \), where the maximum temperature of electrical test is performed.
4. Derate design curve chosen at \( T_J \leq 125°C \), 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 ($T_J \leq 175^\circ C$) and power rating specified. (See 1.3 herein.)
3. Derate design curve chosen at $T_J \leq 150^\circ C$, where the maximum temperature of electrical test is performed.
4. Derate design curve chosen at $T_J \leq 125^\circ C$, and $110^\circ C$ 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://assist.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 and unencapsulated devices are constructed using the following form.

<table>
<thead>
<tr>
<th>JAN certification mark and quality level (see 1.5.1)</th>
<th>JANTXV</th>
</tr>
</thead>
<tbody>
<tr>
<td>First number and first letter symbols (see 1.5.2.1)</td>
<td>1N</td>
</tr>
<tr>
<td>Second number symbols (see 1.5.2.2)</td>
<td>3016</td>
</tr>
<tr>
<td>Suffix symbol for voltage tolerance (see 1.5.3.1)</td>
<td>C</td>
</tr>
<tr>
<td>Suffix symbols for package designator (see 1.5.3.2)</td>
<td>UR–1</td>
</tr>
</tbody>
</table>
6.4.2 **Unencapsulated devices.** The PINs for unencapsulated devices are constructed using the following form:

![Diagram](image)

- JAN certification mark and quality level (see 1.5.1.2)
- Die identifier for unencapsulated devices (see 1.5.5)
- First number and first letter symbols (see 1.5.5.1)
- Suffix symbol for voltage tolerance (see 1.5.3.1)

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.

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

<table>
<thead>
<tr>
<th>JAN level &quot;-1&quot;</th>
<th>JANTX level &quot;-1&quot;</th>
<th>JANTXV level &quot;-1&quot;</th>
<th>JAN level &quot;UR-1&quot;</th>
<th>JANTX level &quot;UR-1&quot;</th>
<th>JANTXV level &quot;UR-1&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN1N3040#-1</td>
<td>JANTX1N3040#-1</td>
<td>JANTXV1N3040#-1</td>
<td>JAN1N3040#UR-1</td>
<td>JANTX1N3040#UR-1</td>
<td>JANTXV1N3040#UR-1</td>
</tr>
<tr>
<td>JAN1N3041#-1</td>
<td>JANTX1N3041#-1</td>
<td>JANTXV1N3041#-1</td>
<td>JAN1N3041#UR-1</td>
<td>JANTX1N3041#UR-1</td>
<td>JANTXV1N3041#UR-1</td>
</tr>
<tr>
<td>JAN1N3042#-1</td>
<td>JANTX1N3042#-1</td>
<td>JANTXV1N3042#-1</td>
<td>JAN1N3042#UR-1</td>
<td>JANTX1N3042#UR-1</td>
<td>JANTXV1N3042#UR-1</td>
</tr>
<tr>
<td>JAN1N3043#-1</td>
<td>JANTX1N3043#-1</td>
<td>JANTXV1N3043#-1</td>
<td>JAN1N3043#UR-1</td>
<td>JANTX1N3043#UR-1</td>
<td>JANTXV1N3043#UR-1</td>
</tr>
<tr>
<td>JAN1N3044#-1</td>
<td>JANTX1N3044#-1</td>
<td>JANTXV1N3044#-1</td>
<td>JAN1N3044#UR-1</td>
<td>JANTX1N3044#UR-1</td>
<td>JANTXV1N3044#UR-1</td>
</tr>
<tr>
<td>JAN1N3045#-1</td>
<td>JANTX1N3045#-1</td>
<td>JANTXV1N3045#-1</td>
<td>JAN1N3045#UR-1</td>
<td>JANTX1N3045#UR-1</td>
<td>JANTXV1N3045#UR-1</td>
</tr>
<tr>
<td>JAN1N3046#-1</td>
<td>JANTX1N3046#-1</td>
<td>JANTXV1N3046#-1</td>
<td>JAN1N3046#UR-1</td>
<td>JANTX1N3046#UR-1</td>
<td>JANTXV1N3046#UR-1</td>
</tr>
<tr>
<td>JAN1N3047#-1</td>
<td>JANTX1N3047#-1</td>
<td>JANTXV1N3047#-1</td>
<td>JAN1N3047#UR-1</td>
<td>JANTX1N3047#UR-1</td>
<td>JANTXV1N3047#UR-1</td>
</tr>
<tr>
<td>JAN1N3048#-1</td>
<td>JANTX1N3048#-1</td>
<td>JANTXV1N3048#-1</td>
<td>JAN1N3048#UR-1</td>
<td>JANTX1N3048#UR-1</td>
<td>JANTXV1N3048#UR-1</td>
</tr>
<tr>
<td>JAN1N3049#-1</td>
<td>JANTX1N3049#-1</td>
<td>JANTXV1N3049#-1</td>
<td>JAN1N3049#UR-1</td>
<td>JANTX1N3049#UR-1</td>
<td>JANTXV1N3049#UR-1</td>
</tr>
<tr>
<td>JAN1N3050#-1</td>
<td>JANTX1N3050#-1</td>
<td>JANTXV1N3050#-1</td>
<td>JAN1N3050#UR-1</td>
<td>JANTX1N3050#UR-1</td>
<td>JANTXV1N3050#UR-1</td>
</tr>
<tr>
<td>JAN1N3051#-1</td>
<td>JANTX1N3051#-1</td>
<td>JANTXV1N3051#-1</td>
<td>JAN1N3051#UR-1</td>
<td>JANTX1N3051#UR-1</td>
<td>JANTXV1N3051#UR-1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>JANHCA1N3821A</th>
<th>JANHCA1N3825A</th>
<th>JANHCB1N3821A</th>
<th>JANHCB1N3825A</th>
</tr>
</thead>
<tbody>
<tr>
<td>JANHCA1N3822A</td>
<td>JANHCA1N3826A</td>
<td>JANHCB1N3822A</td>
<td>JANHCB1N3826A</td>
</tr>
<tr>
<td>JANHCA1N3823A</td>
<td>JANHCA1N3827A</td>
<td>JANHCB1N3823A</td>
<td>JANHCB1N3827A</td>
</tr>
<tr>
<td>JANHCA1N3824A</td>
<td>JANHCA1N3828A</td>
<td>JANHCB1N3824A</td>
<td>JANHCB1N3828A</td>
</tr>
<tr>
<td>JANHCA1N3016B</td>
<td>JANHCA1N3034B</td>
<td>JANHCB1N3016B</td>
<td>JANHCB1N3034B</td>
</tr>
<tr>
<td>JANHCA1N3017B</td>
<td>JANHCA1N3035B</td>
<td>JANHCB1N3017B</td>
<td>JANHCB1N3035B</td>
</tr>
<tr>
<td>JANHCA1N3018B</td>
<td>JANHCA1N3036B</td>
<td>JANHCB1N3018B</td>
<td>JANHCB1N3036B</td>
</tr>
<tr>
<td>JANHCA1N3019B</td>
<td>JANHCA1N3037B</td>
<td>JANHCB1N3019B</td>
<td>JANHCB1N3037B</td>
</tr>
<tr>
<td>JANHCA1N3020B</td>
<td>JANHCA1N3038B</td>
<td>JANHCB1N3020B</td>
<td>JANHCB1N3038B</td>
</tr>
<tr>
<td>JANHCA1N3021B</td>
<td>JANHCA1N3039B</td>
<td>JANHCB1N3021B</td>
<td>JANHCB1N3039B</td>
</tr>
<tr>
<td>JANHCA1N3022B</td>
<td>JANHCA1N3040B</td>
<td>JANHCB1N3022B</td>
<td>JANHCB1N3040B</td>
</tr>
<tr>
<td>JANHCA1N3023B</td>
<td>JANHCA1N3041B</td>
<td>JANHCB1N3023B</td>
<td>JANHCB1N3041B</td>
</tr>
<tr>
<td>JANHCA1N3024B</td>
<td>JANHCA1N3042B</td>
<td>JANHCB1N3024B</td>
<td>JANHCB1N3042B</td>
</tr>
<tr>
<td>JANHCA1N3025B</td>
<td>JANHCA1N3043B</td>
<td>JANHCB1N3025B</td>
<td>JANHCB1N3043B</td>
</tr>
<tr>
<td>JANHCA1N3026B</td>
<td>JANHCA1N3044B</td>
<td>JANHCB1N3026B</td>
<td>JANHCB1N3044B</td>
</tr>
<tr>
<td>JANHCA1N3027B</td>
<td>JANHCA1N3045B</td>
<td>JANHCB1N3027B</td>
<td>JANHCB1N3045B</td>
</tr>
<tr>
<td>JANHCA1N3028B</td>
<td>JANHCA1N3046B</td>
<td>JANHCB1N3028B</td>
<td>JANHCB1N3046B</td>
</tr>
<tr>
<td>JANHCA1N3029B</td>
<td>JANHCA1N3047B</td>
<td>JANHCB1N3029B</td>
<td>JANHCB1N3047B</td>
</tr>
<tr>
<td>JANHCA1N3030B</td>
<td>JANHCA1N3048B</td>
<td>JANHCB1N3030B</td>
<td>JANHCB1N3048B</td>
</tr>
<tr>
<td>JANHCA1N3031B</td>
<td>JANHCA1N3049B</td>
<td>JANHCB1N3031B</td>
<td>JANHCB1N3049B</td>
</tr>
<tr>
<td>JANHCA1N3032B</td>
<td>JANHCA1N3050B</td>
<td>JANHCB1N3032B</td>
<td>JANHCB1N3050B</td>
</tr>
<tr>
<td>JANHCA1N3033B</td>
<td>JANHCA1N3051B</td>
<td>JANHCB1N3033B</td>
<td>JANHCB1N3051B</td>
</tr>
</tbody>
</table>
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 shall evaluate the device for use in their application. The following table should be used as a reference.

<table>
<thead>
<tr>
<th>Superseded part number</th>
<th>Superseding part number</th>
<th>Superseded part number</th>
<th>Superseding part number</th>
<th>Superseded part number</th>
<th>Superseding part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1N3821A</td>
<td>1N3821A–1</td>
<td>1N3023B</td>
<td>1N3023B–1</td>
<td>1N3038B</td>
<td>1N3038B–1</td>
</tr>
<tr>
<td>1N3822A</td>
<td>1N3822A–1</td>
<td>1N3024B</td>
<td>1N3024B–1</td>
<td>1N3039B</td>
<td>1N3039B–1</td>
</tr>
<tr>
<td>1N3823A</td>
<td>1N3823A–1</td>
<td>1N3025B</td>
<td>1N3025B–1</td>
<td>1N3040B</td>
<td>1N3040B–1</td>
</tr>
<tr>
<td>1N3824A</td>
<td>1N3824A–1</td>
<td>1N3026B</td>
<td>1N3026B–1</td>
<td>1N3041B</td>
<td>1N3041B–1</td>
</tr>
<tr>
<td>1N3825A</td>
<td>1N3825A–1</td>
<td>1N3027B</td>
<td>1N3027B–1</td>
<td>1N3042B</td>
<td>1N3042B–1</td>
</tr>
<tr>
<td>1N3826A</td>
<td>1N3826A–1</td>
<td>1N3028B</td>
<td>1N3028B–1</td>
<td>1N3043B</td>
<td>1N3043B–1</td>
</tr>
<tr>
<td>1N3827A</td>
<td>1N3827A–1</td>
<td>1N3029B</td>
<td>1N3029B–1</td>
<td>1N3044B</td>
<td>1N3044B–1</td>
</tr>
<tr>
<td>1N3828A</td>
<td>1N3828A–1</td>
<td>1N3030B</td>
<td>1N3030B–1</td>
<td>1N3045B</td>
<td>1N3045B–1</td>
</tr>
<tr>
<td>1N3016B</td>
<td>1N3016B–1</td>
<td>1N3031B</td>
<td>1N3031B–1</td>
<td>1N3046B</td>
<td>1N3046B–1</td>
</tr>
<tr>
<td>1N3017B</td>
<td>1N3017B–1</td>
<td>1N3032B</td>
<td>1N3032B–1</td>
<td>1N3047B</td>
<td>1N3047B–1</td>
</tr>
<tr>
<td>1N3018B</td>
<td>1N3018B–1</td>
<td>1N3033B</td>
<td>1N3033B–1</td>
<td>1N3048B</td>
<td>1N3048B–1</td>
</tr>
<tr>
<td>1N3019B</td>
<td>1N3019B–1</td>
<td>1N3034B</td>
<td>1N3034B–1</td>
<td>1N3049B</td>
<td>1N3049B–1</td>
</tr>
<tr>
<td>1N3020B</td>
<td>1N3020B–1</td>
<td>1N3035B</td>
<td>1N3035B–1</td>
<td>1N3050B</td>
<td>1N3050B–1</td>
</tr>
<tr>
<td>1N3021B</td>
<td>1N3021B–1</td>
<td>1N3036B</td>
<td>1N3036B–1</td>
<td>1N3051B</td>
<td>1N3051B–1</td>
</tr>
<tr>
<td>1N3022B</td>
<td>1N3022B–1</td>
<td>1N3037B</td>
<td>1N3037B–1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>PIN</th>
<th>Manufacturer's CAGE code</th>
<th>Manufacturer's and user's part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1N3821A</td>
<td>04713</td>
<td>SZM20046H1/H2</td>
</tr>
<tr>
<td>1N3822A</td>
<td>04713</td>
<td>SZ11384H3</td>
</tr>
<tr>
<td>1N3826A</td>
<td>04713</td>
<td>SZ11384H6, SZ11491H42, SZ2308H</td>
</tr>
<tr>
<td>1N3827A</td>
<td>04713</td>
<td>SZM20014H24A, SZM20020H, SZM29001H</td>
</tr>
<tr>
<td>1N3828A</td>
<td>04713</td>
<td>SZM20042H2, SZ113848H8</td>
</tr>
<tr>
<td>1N3016B</td>
<td>04713</td>
<td>SZM20001H701, SZM20049H, SZ11829H101</td>
</tr>
<tr>
<td>1N3017B</td>
<td>04713</td>
<td>SZM2001H702, SZM106H, SZ11829H102</td>
</tr>
<tr>
<td>1N3018B</td>
<td>04713</td>
<td>SZM2001H703, SZ11491H3, SZ11829H103</td>
</tr>
<tr>
<td>1N3019B</td>
<td>04713</td>
<td>SZM20001H704, SZ12533H4, SZ11829H104</td>
</tr>
<tr>
<td>1N3020B</td>
<td>04713</td>
<td>SZM20001H705, SZM20024H, SZ11829H105</td>
</tr>
<tr>
<td>1N3021B</td>
<td>04713</td>
<td>SZM20001H706, SZ12533H6, SZ11829H106</td>
</tr>
<tr>
<td>1N3022B</td>
<td>04713</td>
<td>SZM20001H707, SZ12533H7, SZ11829H107</td>
</tr>
<tr>
<td>1N3023B</td>
<td>04713</td>
<td>SZM2001H708, SZ1661H, SZ11829H108</td>
</tr>
<tr>
<td>1N3024B</td>
<td>04713</td>
<td>SZM20074H, SZ12533H9, SZ11829H109</td>
</tr>
<tr>
<td>1N3025B</td>
<td>04713</td>
<td>SZM20050H, SZM20052H1, SZ11829H110</td>
</tr>
<tr>
<td>1N3026B</td>
<td>04713</td>
<td>SZM20052H2, SZ12533H11, SZ11829H111</td>
</tr>
<tr>
<td>1N3027B</td>
<td>04713</td>
<td>SZ11283H, SZ12533H12, SZ11829H112</td>
</tr>
<tr>
<td>1N3028B</td>
<td>04713</td>
<td>SZM20041H, SZ12533H13, SZ11829H113</td>
</tr>
<tr>
<td>1N3029B</td>
<td>04713</td>
<td>SZ11282H, SZ12382H, SZ11829H114</td>
</tr>
<tr>
<td>1N3030B</td>
<td>04713</td>
<td>SZ12988H10, SZ12533H15, SZ11829H115</td>
</tr>
<tr>
<td>1N3031B</td>
<td>04713</td>
<td>SZ11491H16, SZ11829H116</td>
</tr>
<tr>
<td>1N3032B</td>
<td>04713</td>
<td>SZM20019H, SZ11384H25, SZ11829H117</td>
</tr>
<tr>
<td>1N3034B</td>
<td>04713</td>
<td>SZ14307H</td>
</tr>
<tr>
<td>1N3036B</td>
<td>04713</td>
<td>SL11829H118</td>
</tr>
<tr>
<td>1N3038B</td>
<td>04713</td>
<td>SZ12125H</td>
</tr>
<tr>
<td>1N3042B</td>
<td>04713</td>
<td>SZM29000H, SZ12613H</td>
</tr>
<tr>
<td>1N3045B</td>
<td>04713</td>
<td>SZM20052H3, SZ10539H, SZ12126H</td>
</tr>
<tr>
<td>1N3046B</td>
<td>04713</td>
<td>SZM20038H1</td>
</tr>
<tr>
<td>1N3049B</td>
<td>04713</td>
<td>SZ12114H2</td>
</tr>
<tr>
<td>1N3051B</td>
<td>04713</td>
<td>SZM20034H, SZM20048H1</td>
</tr>
</tbody>
</table>
6.7 Suppliers of JANHC die. The qualified JANHC suppliers with the applicable letter version (example JANHCA1N3821A) will be identified on the QML.

<table>
<thead>
<tr>
<th>JANHC ordering information</th>
<th>PIN</th>
<th>Manufacturer CAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1N3821A through 1N3828A</td>
<td>JANHCA1N3821A through JANHCA1N3828A</td>
</tr>
<tr>
<td></td>
<td>1N3016B through 1N3051B</td>
<td>JANHCA1N3016B through JANHCA1N3051B</td>
</tr>
</tbody>
</table>

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

- α: Temperature coefficient.
- I<sub>F</sub>: Forward current, DC value, no alternating component.
- I<sub>R1</sub>: Reverse current.
- I<sub>R2</sub>: Reverse current for suffix –1 devices.
- I<sub>R3</sub>: Reverse current, dc max (after life test).
- I<sub>sig</sub>: Detector signal current.
- I<sub>Z</sub>: Zener current.
- I<sub>zk</sub>: Regulator or reference current, dc near breakdown knee.
- I<sub>ZM</sub>: Maximum zener current.
- I<sub>ZSM</sub>: Maximum zener surge current.
- I<sub>zt</sub>: Zener test current.
- P<sub>T</sub>: Total power dissipation, all terminals.
- R<sub>θJC</sub>: Thermal resistance, junction to case.
- T<sub>A</sub>: Ambient or free air temperature.
- T<sub>C</sub>: Case temperature.
- T<sub>J</sub>: Junction temperature.
- T<sub>stg</sub>: Storage temperature.
- V<sub>F</sub>: Forward voltage.
- V<sub>R</sub>: Reverse voltage.
- V<sub>Z</sub>: Regulator voltage.
- V<sub>z(reg)</sub>: Voltage regulation.
- Z<sub>Z</sub>: Impedance.
- Z<sub>zk</sub>: 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 – EC  
Air Force – 85  
NASA – NA  
DLA – CC  

Preparing activity:  
DLA – CC  
(Project 5961–2016–107)  

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

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 https://assist.dla.mil.