

The documentation and process conversion measures necessary to comply with this document shall be completed by 19 March 2018.

INCH-POUND

MIL-PRF-19500/478L  
w/AMENDMENT 1  
19 December 2017  
SUPERSEDING  
MIL-PRF-19500/478L  
27 January 2017

PERFORMANCE SPECIFICATION SHEET

DIODE, SILICON, POWER RECTIFIER, ULTRA FAST RECOVERY,  
TYPES 1N5812, 1N5814, 1N5816, AND R VERSIONS,  
JAN, JANTX, JANTXV, JANHC, JANKC, AND JANS

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

The requirements for acquiring the product described herein shall consist of this specification sheet and [MIL-PRF-19500](#).

1. SCOPE

1.1 Scope. This specification covers the performance requirements for silicon, fast recovery power rectifier diodes. Four levels of product assurance (JAN, JANTX, JANTXV, and JANS) are provided for each device type as specified in [MIL-PRF-19500](#). Two product assurance JANHC and JANKC are provided for unencapsulated devices.

\* 1.2 Package outlines and die topography. The device packages for the encapsulated device types are as follows: DO-4 in accordance with [figure 1](#) and button tab (BT) In accordance with [figure 2](#). The dimensions and topography for JANHC and JANKC unencapsulated die are as follows: The A version die in accordance with [figure 3](#), the B version die in accordance with [figure 4](#), the C version die in accordance with [figure 5](#), the D, E, and F versions die in accordance with [figure 6](#), and G version in accordance with [figure 7](#).

\* 1.3 Maximum ratings.

Types (1)	VR	VRWM	Io (1) TC = +100°C	IFSM tp = 8.3 ms TC = +100°C	t <sub>rr</sub>	RθJC	T <sub>J</sub> and T <sub>STG</sub>
	<u>V dc</u>	<u>V (pk)</u>	<u>A dc</u>	<u>A(pk)</u>	<u>ns</u>	<u>°C/W</u>	<u>°C</u>
1N5812, BT, R	50	50	20	400	35	1.5	-65°C to +175°C
1N5814, BT, R	100	100	20	400	35		
1N5816, BT, R	150	150	20	400	35		

(1) Derate linearly, 250 mA/°C from +100°C to +150°C and 300 mA/°C above +150°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](mailto: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



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

1.5.1 JAN certification mark and quality level 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", "JANTXV" and "JANS".

1.5.2 Quality level designators for unencapsulated devices (die). The quality level designators for unencapsulated devices (die) that are applicable for this specification sheet from the lowest to the highest level are as follows: "JANHC" and "JANKC".

1.5.3 Device type. The designation system for the device types of diodes covered by this specification sheet are as follows.

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

1.5.3.2 Second number symbols. The second number symbols for the semiconductors covered by this specification sheet are as follows: "5812", "5814", and "5816".

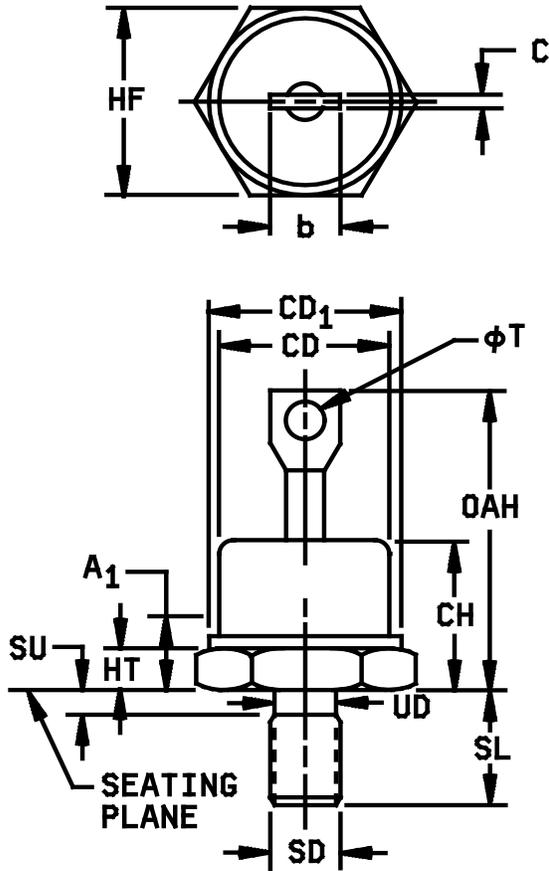
\* 1.5.4 Suffix symbols. The following suffix letters are incorporated in the PIN in the order listed in the table as applicable:

	A blank first suffix symbol indicates a stud mount package (see <a href="#">figure 1</a> ).
R	R suffix devices indicates a stud mount package with the threaded terminal as the Anode (see <a href="#">figure 1</a> ).
BT	BT suffix devices indicates a button tab ( <a href="#">figure 2</a> ).

1.5.5 Lead finish. The lead finishes applicable to this specification sheet are listed on [QML-19500](#).

1.5.6 Die identifiers for unencapsulated devices (manufacturers and critical interface identifiers). The manufacturer die identifiers that are applicable for this specification sheet are "A", "B", "C", "D", "E" and "F".

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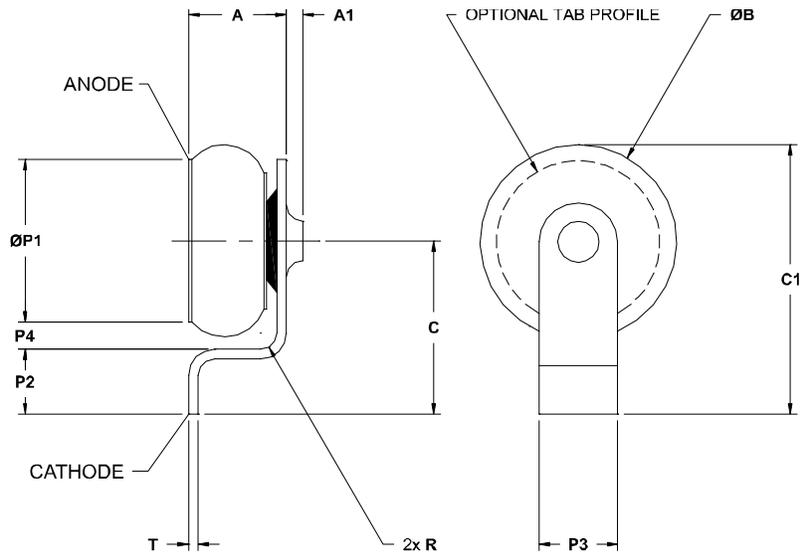
	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A <sub>1</sub>		.250		6.35	
b		.250		6.35	3
C	.018	.065	0.46	1.65	
CD	.265	.424	6.74	10.77	
CD <sub>1</sub>	.265	.437	6.74	11.10	
CH	.300	.405	7.62	10.28	
HF	.424	.437	10.77	11.10	
HT	.075	.175	1.91	4.44	
OAH	.600	.800	15.24	20.32	
SD					4, 6
SL	.422	.453	10.72	11.50	
SU		.078		1.98	5
φT	.066	.103	1.68	2.62	
UD	.163	.189	4.14	4.80	

NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. Angular orientation and contour of this terminal is undefined.
4. Pitch diameter .190-32 UNF-2A (coated) - .1697 (4.310 mm).
5. Length of incomplete or undercut threads of UD.
6. Anode for R suffix devices.
7. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

FIGURE 1. Physical dimensions (DO-4).

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Dim	Min	Max	Dim	Min	Max
A	0.125"	0.150"	P1	0.145"	0.155"
A1	—	0.020"	P2	0.055"	0.075"
ØB	—	0.190"	P3	0.090"	0.110"
C	0.190"	0.210"	P4	0.060" REF	
C1	0.280" REF		T	0.008"	0.012"
			R	0.015" REF	

Notes:

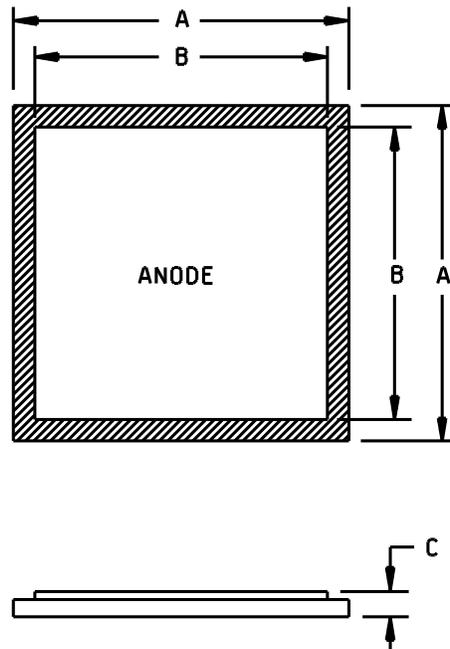
\* Diode body profile may differ from the one shown for illustration

\*\*Dimensions prior to solder dipping

Polarity : Normal = Anode to Tab, Reverse = Cathode to Tab

\* Figure 2 Physical Dimensions, Button Tab ( BT)

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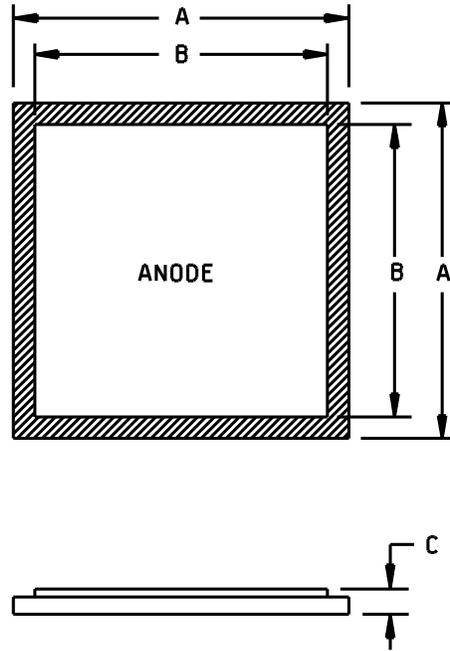
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.130	.133	3.30	3.37
B	.114	.117	2.89	2.97
C	.009	.010	0.228	0.254

NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. The physical characteristics of the die are: Metallization {front (anode), back (cathode)} consists of: Ag thickness = 3,000 Å minimum, Ni thickness = 1,500 Å minimum, Cr thickness = 800 Å minimum.
4. Requirements in accordance with MIL-PRF-19500 (appendix E) are performed in a DO-4 package (see 6.5).
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

FIGURE 3. Physical dimensions JANC die dimensions (A-version).

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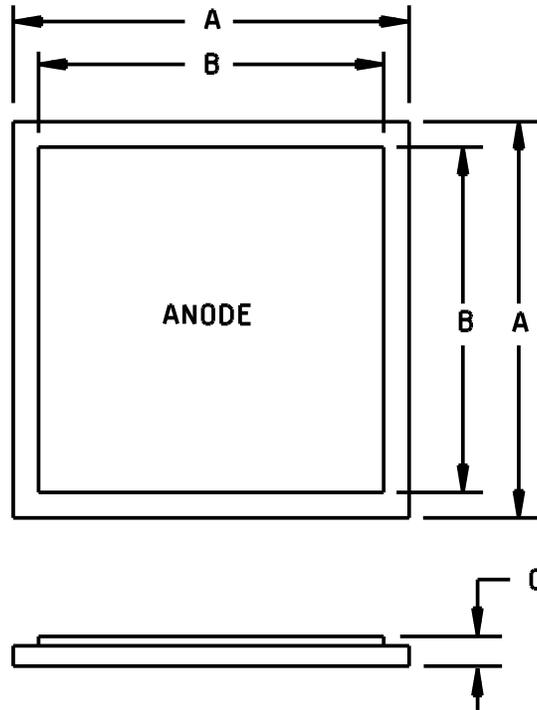
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.130	.143	3.30	3.63
B	.114	.133	2.89	3.37
C	.009	.010	0.228	0.254

NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. The physical characteristics of the die are: Metallization {front (anode), back (cathode)} consists of: Ag thickness = 3,000 Å minimum, Ni thickness = 1,500 Å minimum, Cr thickness = 800 Å minimum, optionally Ti thickness = 300 Å minimum.
4. Requirements in accordance with MIL-PRF-19500 (appendix H) are performed in a DO-4 package (see 6.5).
5. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

FIGURE 4. Physical dimensions JANC die dimensions (B-version).

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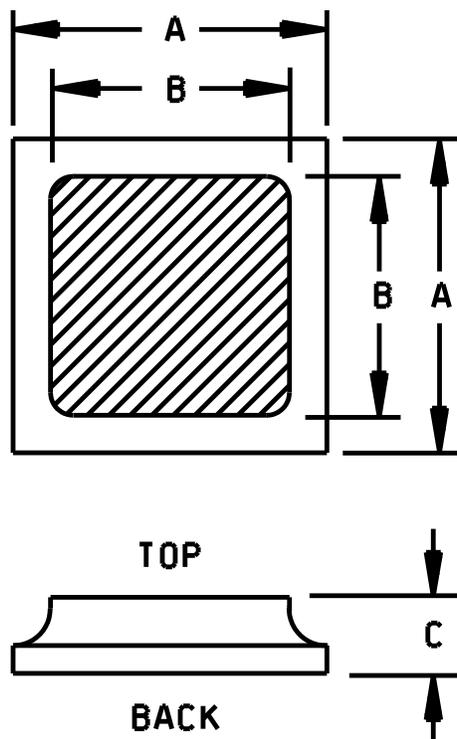
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.152	.156	3.86	3.96
B	.126	.130	3.20	3.30
C	.008	.012	0.203	0.31

NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. The physical characteristics of the die are: Metallization (front (anode)), consists of: AL thickness = 60,000 Å minimum, (back, (cathode)) consists of: AU thickness = 2,500 Å minimum.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

FIGURE 5. Physical dimensions JANC (JANHNC and JANKC) die dimensions (C-version).

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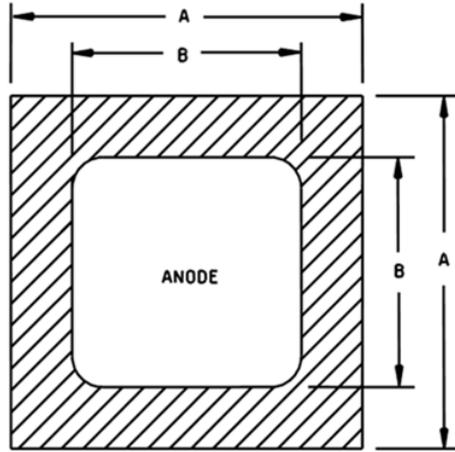
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.136	.142	3.45	3.61
B	.117	.123	2.97	3.12
C	.007	.013	0.18	0.33

NOTES:

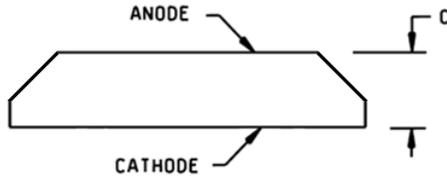
1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. The metallization consists of:  
D version: front (anode) - aluminum; back (cathode) - gold.  
E version: front (anode) - aluminum; back (cathode) - silver.  
F version: front (anode) - silver; back (cathode) - silver.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

FIGURE 6. Physical dimensions JANC (JANHNC and JANKNC) die dimensions (D, E, and F - versions).

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BACKSIDE IS CATHODE



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.162	0.168	4.11	4.27
B	0.128	0.134	3.25	3.40
C	0.008	0.012	0.20	0.30

NOTES:

1. Dimensions are in inches.
2. Millimeter equivalents are given for general information only.
3. Anode is Ti (1.2kÅ) / Ni (1.8kÅ) / Ag 30kÅ.
4. Cathode is Ti (1.2kÅ) / Ni (1.8kÅ) / Ag 30kÅ.

\* FIGURE 7. Physical dimensions JANC (JANHc and JANKC) die dimensions (G version).

## 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 <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. Abbreviations, symbols, and definitions used herein shall be as specified in [MIL-PRF-19500](#).

\* 3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-19500](#) and on [figure 1](#) for DO-4 and on [figure 2](#) for (BT) and [figure 3](#), [figure 4](#), [figure 5](#), [figure 6](#), and [figure 7](#) (JANHC and JANKC).

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

3.5 Marking. Marking shall be in accordance with [MIL-PRF-19500](#).

3.5.1 Polarity. Polarity shall be in accordance with [MIL-PRF-19500](#). The reversed units shall also be marked with an R following the last digit in the type number.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in [1.3](#) and [table I](#) herein.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in [table I](#) herein.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

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4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).
- c. Conformance inspection (see 4.4).

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

4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of 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.

4.2.2 Screening JANHC and JANKC. Screening shall be in accordance with appendix G of MIL-PRF-19500. As a minimum, die shall be 100 percent probed in accordance with table I, subgroup 2 herein for  $I_{R1}$  and  $V_{(BR)1}$  only.  $V_{F1}$  and  $V_{F2}$  shall be performed on a sample of ten pieces mounted on a DO-4 (or equivalent) package.

4.3 Screening (JANS, JANTXV, and JANTX levels only). Screening shall be in accordance with appendix E, table E-IV of MIL-PRF-19500, and as specified herein. Specified electrical measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen	Measurement	
	JANS level	JANTXV and JANTX level
(1) 3b	Surge, see 4.3.1.	Surge, see 4.3.1.
(2) 3c	Thermal impedance (see 4.3.2 and 4.4.1).	Thermal impedance (see 4.3.2 and 4.4.1).
4	Not applicable.	Not applicable.
9	Not applicable.	Not applicable.
10	Not applicable.	Not applicable.
(3) 11	$V_{F2}$ and $I_{R1}$ .	$V_{F2}$ and $I_{R1}$ .
12	Burn-in, see 4.3.3, method 1038 of MIL-STD-750, test condition A. $t = 240$ hours.	Burn-in, see 4.3.3, method 1038 of MIL-STD-750, test condition A.
(3) 13	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq 2.5 \mu\text{A dc}$ or 100 percent of initial value, whichever is greater. $\Delta V_{F2} \leq +0.05 \text{ V dc (pk)}$ change from initial value.	Subgroup 2 of table I herein; $\Delta I_{R1} \leq 2.5 \mu\text{A dc}$ or 100 percent of initial value, whichever is greater. $\Delta V_{F2} \leq +0.05 \text{ V dc (pk)}$ change from initial value.

(1) Surge shall precede thermal response. These tests shall be performed anytime after screen 3 and before screen 10.

(2) Thermal impedance need not be repeated for JANTX and JANTXV levels.

(3)  $I_{R1}$  measurement shall not be indicative of an open condition.

\* (4) For BT packages PIND not applicable, Hermeticity may be satisfied by the use of method 2068

\* (5) For DO-4 devices manufactured with a hermetic internal element Hermeticity and PIND testing not required.

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\* 4.3.1 Surge current. Surge current, see method 4066, Condition A, of [MIL-STD-750](#).

- a.  $I_{FSM} = 400$  A, six surges,  $t_p = 8.3$  ms or rectangular pulse of equivalent  $I_{RMS}$ .
- b.  $I_O = 0$  A,  $V_{RMS} = 0$  V, duty factor 1 percent minimum  $T_A = +25^\circ\text{C}$ .

4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3101 or 4081 of [MIL-STD-750](#) using the guidelines in that method for determining  $I_M$ ,  $I_H$ ,  $t_H$ ,  $t_{SW}$  ( $V_C$  and  $V_H$  where appropriate). Measurement delay time ( $t_{MD}$ ) = 70  $\mu\text{s}$  max. See [table II](#), subgroup 4 herein.

4.3.3 Burn-in. Burn-in conditions for all quality levels are as follows: method 1038 of [MIL-STD-750](#), test condition A,  $T_C = +125^\circ\text{C}$ ;  $V_R = 80$  to 85 percent of rated  $V_R$  dc (see [1.3](#)).

\* 4.4 Conformance inspection. Conformance inspection shall be in accordance with [MIL-PRF-19500](#). For BT packages hermeticity may be satisfied by the use of test method 2068. For DO-4 devices manufactured with a hermetic internal element Hermeticity testing not applicable.

\* 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 tables E-VIA (JANS) and E-VIB (JAN, JANTX, and JANTXV) of [MIL-PRF-19500](#) and as follows. Electrical measurements (end-points) shall be in accordance with [table I](#), subgroup 2 and the applicable step and footnotes of [table III](#) herein.

\* 4.4.2.1 Group B inspection, table E-VIA (JANS) of [MIL-PRF-19500](#).

	<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
*	B3	4066	Condition A, $T_C = +100^\circ\text{C}$ ; $t_p \leq 8.3$ ms; $V_R =$ rated $V_R$ (see <a href="#">1.3</a> ) six 1/120 s surges; 1 surge/minute maximum. $I_{FSM} = 400$ A dc, $I_O = 20$ A dc.
*	B4	1037	2,000 cycles, 25 percent rated $I_O \leq I_O$ applied $\leq$ rated $I_O$ (see <a href="#">4.5.2</a> ). For BT devices $I_O = 2.8A$ minimum unheatsunk.
	B5	1038	Condition A, $t = 1000$ hours, $T_C = +150^\circ\text{C}$ $V_R = 80$ percent of $V_{RWM}$ (pk) (see <a href="#">1.3</a> ). For irradiated devices, include $t_{rr}$ as an end-point measurement.
	B8	1018	Only to be performed when organics or silicones are present in the device package; $n = 3$ , $c = 0$ .

4.4.2.2 Group B inspection, table E-VIB (JAN, JANTX, and JANTXV) of [MIL-PRF-19500](#).

	<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
*	B2	4066	Condition A, $T_C = +100^\circ\text{C}$ ; $t_p \leq 8.3$ ms; $V_R =$ rated $V_R$ (see <a href="#">1.3</a> ) six 1/120 s surges; 1 surge/minute maximum. $I_{FSM} = 400$ A dc, $I_O = 20$ A dc.
	B3	1036	$I_F \geq 0.25 I_O$ (see <a href="#">4.5.2</a> ) 2,000 cycles. For irradiated devices, include $t_{rr}$ as an end-point measurement.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Terminal strength: Test condition A; weight = 10 pounds; t = 15 s. Bending stress: Test condition F, method B; weight = 3 pounds; t = 15 s. Lead torque: Test condition D1; torque = 10 ounce-inches; t = 15 s. Stud torque: Test condition D2; torque = 10 pound-inches; t = 15 s. BT Only: Lead Fatigue test Condition E
C5	4081 or 3101	$R_{\theta JC} = 1.5^{\circ}\text{C/W}$ ; $t_H \geq 20$ seconds; heating current ( $I_H$ ) $\geq$ rated $I_O$ ; $t_{MD} \leq 250 \mu\text{s}$ ; measurement current $10 \text{ mA} \leq I_M \leq 100 \text{ mA}$ .
C6	1036	$I_F \geq 0.25 I_O$ (see 4.5.2); 6,000 cycles, JANS only. For irradiated devices, include $t_{rr}$ as an end-point measurement.
C6	1038	Condition A, t = 1000 hours, $T_J = +175^{\circ}\text{C}$ , $V_R = 80$ percent of $V_{RWM}$ (pk) (see 1.3), JAN, JANTX and JANTXV only. For BT devices $I_O = 2.8\text{A}$ minimum unheatsunk.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-IX of MIL-PRF-19500 and as specified in table II herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 and the applicable step of table III herein.

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

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

\* 4.5.2 DC intermittent operation life. 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  $+85^{\circ}\text{C}$  minimum 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  $30 \text{ s} \leq t_{\text{heating}} \leq 180 \text{ s}$ . The forward current may be steady-state dc, full-wave rectified dc, or the equivalent half-sine wave dc, of the specified value. The test duration shall be the specified number of cycles. 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 quality 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.

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\* TABLE I. Group A inspection.

Inspection <u>1</u> /	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance <u>2</u> /	3101 or 4081	See 4.3.2	Z <sub>θJX</sub>			°C/W
* Forward voltage	4011	Condition B, Duty cycle ≤ 2 percent (pulsed see 4.5.1); t <sub>p</sub> ≤ 8.3 ms				
		I <sub>F</sub> = 10 A	V <sub>F1</sub>	.860		V
		I <sub>F</sub> = 20 A	V <sub>F2</sub>	.950		V
Reverse current	4016	DC method; V <sub>R</sub> = rated V <sub>R</sub> (see 1.3)	I <sub>R1</sub>		10	μA
Breakdown voltage	4021	I <sub>R</sub> = 100 μA	V <sub>(BR)1</sub>			
* 1N5812, BT, R				60		V
* 1N5814, BT, R				110		V
* 1N5816, BT, R				160		V
<u>Subgroup 3</u>						
High temperature operation		T <sub>C</sub> = +100°C				
Reverse current	4016	DC method, V <sub>R</sub> = rated V <sub>R</sub> ; (see 1.3)	I <sub>R2</sub>		1.00	mA
* Forward voltage	4011	Condition B, I <sub>FM</sub> = 10 A, duty cycle ≤ 2 percent (pulsed); t <sub>p</sub> ≤ 8.3 ms	V <sub>F3</sub>	.780		V
Low temperature operation		T <sub>A</sub> = -65°C				
* Forward voltage	4011	Condition B, I <sub>FM</sub> = 10 A, duty cycle ≤ 2 percent (pulsed); t <sub>p</sub> ≤ 8.3 ms	V <sub>F4</sub>		1.05	V
Breakdown voltage	4021	I <sub>R</sub> = 100 μA	V <sub>(BR)2</sub>			
* 1N5812, BT, R				50		V
* 1N5814, BT, R				100		V
* 1N5816, BT, R				150		V

See footnote at end of table.

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\* TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u>						
Reverse recovery time	4031	Test condition B4 $I_F = I_R = 1 \text{ A (pk)}$ $I_{(REC)} = 0.1 \text{ A}$ ; $di/dt = 85 \text{ A}/\mu\text{s}$ minimum	$t_{rr}$		35	ns
Junction capacitance	4001	$V_R = 10 \text{ V}$ , $f = 1 \text{ MHz}$ $V_{SIG} = 50 \text{ mV (p-p)}$ maximum	$C_J$		300	pF
Forward recovery voltage	4026	$t_P \geq 20 \text{ ns}$ , $t_r = 8 \text{ ns}$ ; $I_F = 1,000 \text{ mA}$	$V_{FRM}$		2.2	V (pk)
Forward recovery time	4026	$I_F = 1,000 \text{ mA}$	$t_{fr}$		15	ns
<u>Subgroups 5, 6, and 7</u>						
Not applicable						

1/ For sampling plan, see [MIL-PRF-19500](#).

2/ This test required for the following end-point measurements only:  
Group B, subgroups 3, 4, and 5 (JANS).  
Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).  
Group C, subgroup 2 and 6.  
Group E, subgroup 1.

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

Inspection	MIL-STD-750		Sampling plan
	Method	Conditions	
<u>Subgroup 1</u> Thermal shock (glass strain) Electrical measurements	1056	0°C to +100°C, 100 cycles.  See <a href="#">table I</a> , subgroup 2	45 devices c = 0
<u>Subgroup 2</u> Steady-state dc blocking life Electrical measurements	1038	Test condition A, except in accordance with <a href="#">4.3.3</a> ; 1,000 hours. For irradiated devices, include $t_{rr}$ as an end-point measurement. See <a href="#">table I</a> , subgroup 2.	45 devices c = 0
<u>Subgroup 3</u> Not applicable			
<u>Subgroup 4</u> Thermal impedance curves	3101 or 4081	See <a href="#">MIL-PRF-19500</a> .	
<u>Subgroup 5</u> Not applicable			

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\* TABLE III. Groups B, C, and E delta measurements. 1/ 2/ 3/ 4/ 5/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions				
1.	Forward voltage	4011	Condition B, duty cycle $\leq$ 2 percent (pulsed see 4.5.1); $t_p \leq$ 8.3 ms. $I_F = 10$ A	$\Delta V_{F1}$	$\pm 50$ mV dc change from initial value		V
2.	Reverse current	4016	DC method; $V_R =$ rated $V_R$ (see 1.3)	$\Delta I_{R1}$	$\pm 100$ percent of initial value or $\pm 250$ nA dc change from initial value, whichever is greater.		$\mu$ A

- 1/ Devices which exceed the table I, subgroup 2 (group A) limits for this test shall not be accepted.
- 2/ The delta measurements for group B inspections in table E-VIA (JANS) of MIL-PRF-19500 are as follows:
- Subgroup 3, see table III herein, steps 1 and 2.
  - Subgroup 4, see table III herein, step 2.
  - Subgroup 5, see table III herein, steps 1 and 2.
- 3/ The delta measurements for group B inspections in table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are as follows:
- Subgroup 3, see table III herein, steps 1 and 2.
  - Subgroup 6, see table III herein, step 1.
- 4/ The delta measurements for group C inspections in table E-VII of MIL-PRF-19500 are as follows:
- Subgroup 2, see table III herein, step 1 (JANS).
  - Subgroup 6, see table III herein, steps 1 and 2 (JANS), step 1 (JAN, JANTX, and JANTXV).
- 5/ The delta measurements for group E inspections in table E-IX of MIL-PRF-19500 are: Subgroups 1 and 2, see table III herein, steps 1 and 2.

## 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:

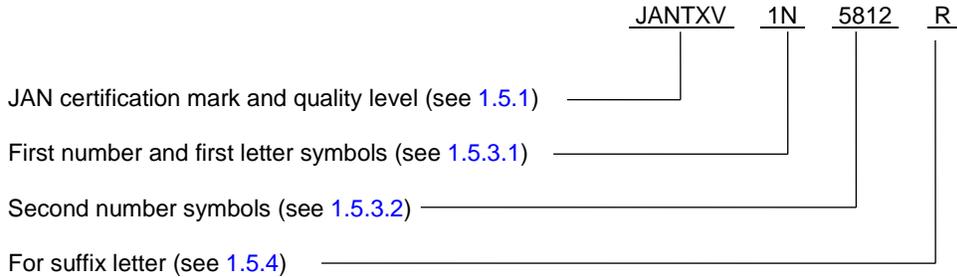
- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. Product assurance level and type designator.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List ([QML 19500](#)) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail [vqe.chief@dla.mil](mailto: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>.

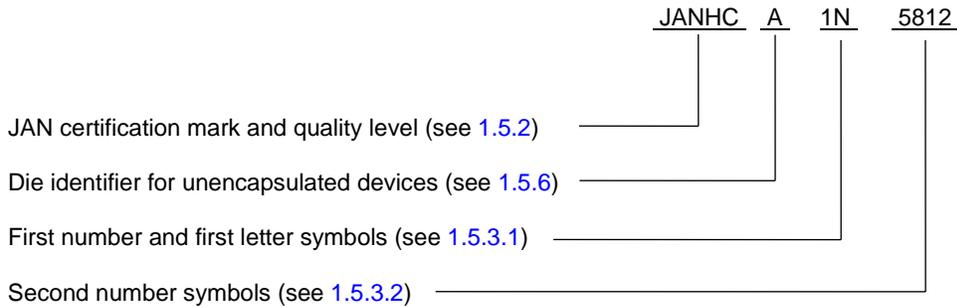
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6.4 PIN construction example.

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



6.4.2 Unencapsulated devices. The PINs for un-encapsulated devices are constructed using the following form.



6.5 List of PINs. The following is a list of possible PINs available on this specification sheet.

6.5.1 PINs for encapsulated devices. The following is a list of possible PINs for encapsulated devices available on this specification sheet.

PINs for types 1N5812, 1N5814, and 1N5816			
JAN1N5812	JANTX1N5812	JANTXV1N5812	JANS1N5812
JAN1N5814	JANTX1N5814	JANTXV1N5814	JANS1N5814
JAN1N5816	JANTX1N5816	JANTXV1N5816	JANS1N5816
JAN1N5812R	JANTX1N5812R	JANTXV1N5812R	JANS1N5812R
JAN1N5814R	JANTX1N5814R	JANTXV1N5814R	JANS1N5814R
JAN1N5816R	JANTX1N5816R	JANTXV1N5816R	JANS1N5816R
JAN1N5812BT	JANTX1N5812BT	JANTXV1N5812BT	JANS1N5812BT
JAN1N5814BT	JANTX1N5814BT	JANTXV1N5814BT	JANS1N5814BT
JAN1N5816BT	JANTX1N5816BT	JANTXV1N5816BT	JANS1N5816BT

\* Note. All part numbers include the BT packages.

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\* 6.5.2 PINs for unencapsulated devices (die). The following is a list of possible PINs and qualified suppliers for unencapsulated devices available on this specification sheet. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA1N5812) will be identified on the QPL.

JANHC and JANKC ordering information (1)						
PIN	Manufacturer					
	59377	11961	33178	12969	12969	12969
1N5812	JANHCA1N5812	JANHCB1N5812	JANHCC1N5812	JANHCD1N5812	JANHCE1N5812	JANHCF1N5812
1N5814	JANHCA1N5814	JANHCB1N5814	JANHCC1N5814	JANHCD1N5814	JANHCE1N5814	JANHCF1N5814
1N5816	JANHCA1N5816	JANHCB1N5816	JANHCC1N5816	JANHCD1N5816	JANHCE1N5816	JANHCF1N5816
Figure number	3	4	5	6	6	6

JANHC and JANKC ordering information (1)		
PIN	Manufacturer	
	13409	
1N5812	JANHCG1N5812	
1N5814	JANHCG1N5814	
1N5816	JANHCG1N5816	
Figure number	7	

(1) For JANKC product assurance level, replace the "JANHC" prefix with "JANKC".

\* 6.6 Amendment notations. The margins of this specification are marked with asterisks 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 and relationship to the last previous issue.

Custodians:  
Army - CR  
Navy - EC  
Air Force - 85  
DLA - CC

Preparing activity:  
DLA - CC  
  
(Project 5961-2017-073)

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

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