

The documentation and process conversion measures necessary to comply with this document shall be completed by 14 November 2022.

INCH-POUND

MIL-PRF-19500/620L
w/AMENDMENT 1
12 August 2022
SUPERSEDING
MIL-PRF-19500/620L
22 August 2019

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, RECTIFIER, SCHOTTKY BARRIER,
ENCAPSULATED (AXIAL LEADED AND SURFACE MOUNT) AND UNENCAPSULATED,
TYPES 1N5822 AND 1N6864, QUALITY LEVELS JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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

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

1. SCOPE

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

1.2 Physical dimensions.

* 1.2.1 Package outlines. The device package outlines for the encapsulated devices are as follows: Axial leaded package in accordance with [figure 1](#), square end-cap surface mount version US in accordance with [figure 2](#), surface mount version UDB in accordance with [figure 3](#).

* 1.2.2 Unencapsulated die topography. The dimensions and topography for JANHC and JANKC unencapsulated die are A version die in accordance with [figure 4](#), and B version die in accordance with [figure 5](#).

* 1.3 Maximum ratings. Unless otherwise specified, $T_A = +25^{\circ}\text{C}$.

Types	V_{RWM} (1) (2)	I_O (1) (2)	I_{FSM}	$Z_{\theta JX}$ (3)	$R_{\theta JL}$.375 inch (9.52 mm) lead length	$R_{\theta JEC}$	$R_{\theta JSP(IS)}$	T_{STG}	T_J (1)
	<u>V(pk)</u>	<u>A dc</u>	<u>A(pk)</u>	<u>°C/W</u>	<u>°C/W</u>	<u>°C/W</u>	<u>°C/W</u>	<u>°C</u>	<u>°C</u>
1N5822, 1N5822US	40	3.0	80	2.5	30	10		-65 to	-65 to
1N5822UDB	40	3.0	80	6.2			36	+150	+125
1N6864, 1N6864US	80	3.0	80	2.5	30	10			

- (1) See [figures 6](#), and [7](#), [8](#), and [9](#) for derating curves and for effects of V_R on T_J . The maximum T_J depends on the voltage applied.
- (2) $T_A = 55^{\circ}\text{C}$ for both axial and MELF (US) on printed circuit board (PCB), PCB = FR-4 .0625 inch (1.59mm) pad; area of each pad = .4 square inch (258.06 square mm).
- (3) See [figure 10](#) for thermal impedance curve.

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MIL-PRF-19500/620L
w/AMENDMENT 1

* 1.4 Primary electrical characteristics. Unless otherwise specified, $T_A = +25^\circ\text{C}$.

Types	V_{FM1} $I_{FM} = 1.0\text{ A}$	V_{FM2} $I_{FM} = 3.0\text{ A}$	V_{FM3} $I_{FM} = 9.4\text{ A}$	I_{RM} $V_{RM} = 40\text{ V dc (1N5822)}$ $V_{RM} = 80\text{ V dc (1N6864)}$ pulsed method (see 4.5.1)		$R_{\theta JL}$.375 inch (9.52 mm) Lead length	$R_{\theta JEC}$	$R_{\theta JSP(IS)}$
				$T_J = +25^\circ\text{C}$ I_{RM1}	$T_J = +100^\circ\text{C}$ I_{RM2}			
	$V\text{ (pk)}$	$V\text{ (pk)}$	$V\text{ (pk)}$	mA	mA	$^\circ\text{C/W}$	$^\circ\text{C/W}$	
1N5822	.40	.50	.70	.10	12.5	30		
1N5822US	.40	.50	.70	.10	12.5		10	
1N5822UDB	.40	.50	.70	.10	12.5			36
1N6864	.50	.70	N/A	.15	18.0	30		
1N6864US	.50	.70	N/A	.15	18.0		10	

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.

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", "JANTXV", and "JANS".

1.5.1.2 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".

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

1.5.2.1 First number and first letter symbols. The semiconductors 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 semiconductors covered by this specification sheet are as follows: "5822" and "6864".

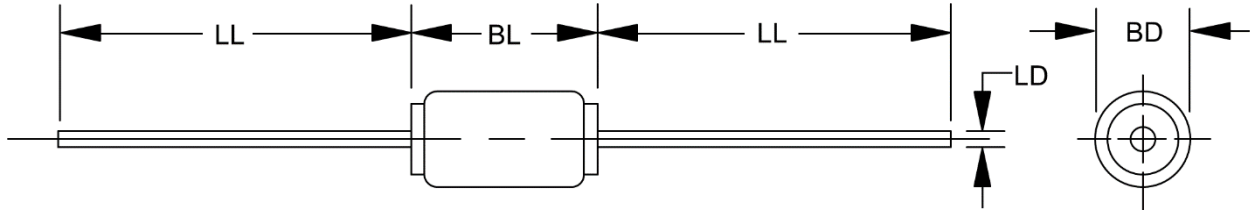
* 1.5.3 Suffix symbols. The following suffix symbols are incorporated in the PIN as applicable.

	A blank suffix symbol indicates an axial leaded through-hole mount package (see figure 1).
US	The 'US' suffix symbol indicates a surface mount package with square endcaps (see figure 2).
UDB	The 'UDB' suffix symbol indicates a surface mount LCC 3 leads (land pattern of B-body [US]). Pad 3 = shielding, connected to the lid (See figure 3).

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 manufacturers die identifiers that are applicable for this specification sheet are "A", and "B" (see figure 4, figure 5, and 6.5.1).

MIL-PRF-19500/620L
w/AMENDMENT 1



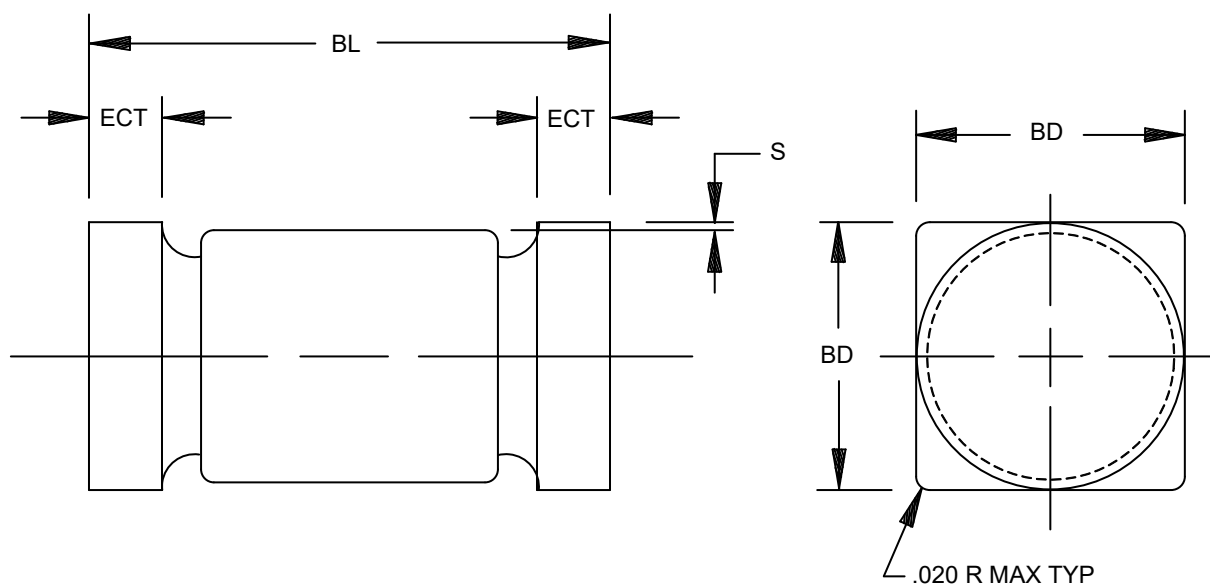
Symbol	Inches	Inches	mm	mm
	Min	Max	Min	Max
BD	.115	.145	2.92	3.68
BL	.130	.195	3.30	4.95
LD	.036	.042	0.91	1.07
LL	.900	1.300	22.86	33.02

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
- * 2. In accordance with ASME Y14.5, diameters are equivalent to ϕ x symbology.
- * 3. Dimension BL shall include the entire body including slugs and sections of the lead over which the diameter is uncontrolled. This uncontrolled area is defined as the zone between the edge of the diode body and extending .050 inch (1.27 mm) onto the leads.

* FIGURE 1. Physical dimensions of 1N5822 and 1N6864.

MIL-PRF-19500/620L
w/AMENDMENT 1



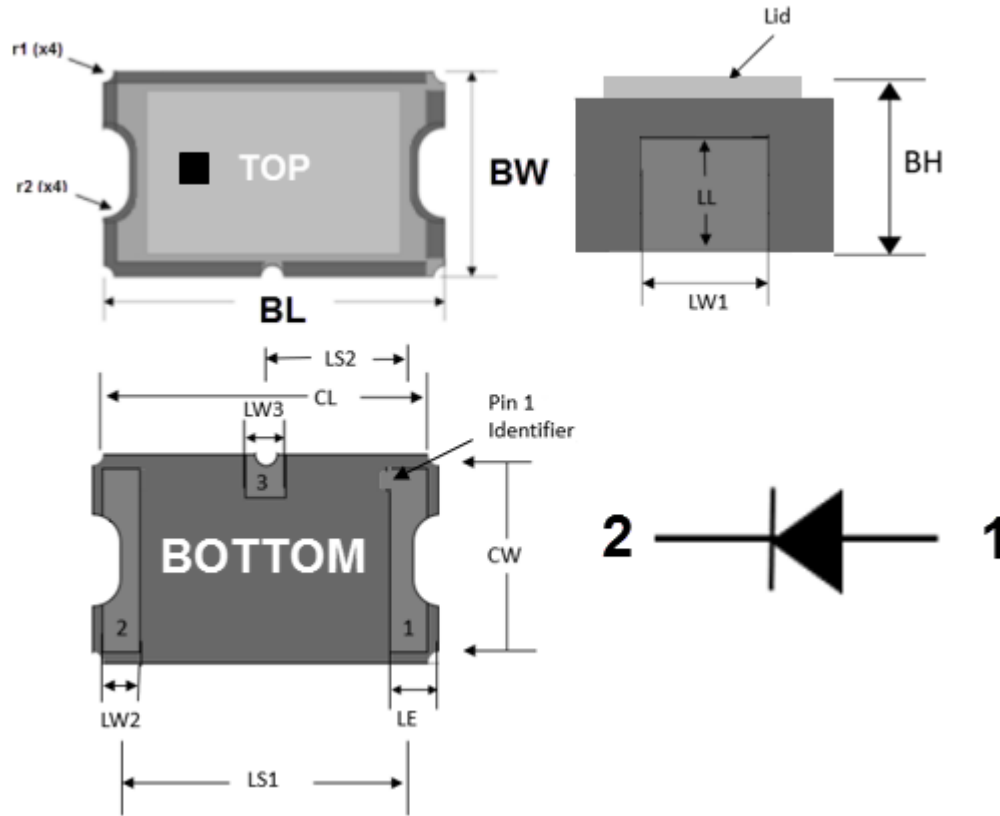
Symbol	Inches	Inches	mm	mm
	Min	Max	Min	Max
BD	.137	.148	3.48	3.76
BL	.200	.225	5.08	5.72
ECT	.019	.028	0.48	0.71
S	.003		0.08	

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Dimensions are pre-solder dip.
- * 3. In accordance with ASME Y14.5, diameters are equivalent to ϕ x symbology.

FIGURE 2. Physical dimensions of surface mount family, 1N5822US and 1N6864US.

MIL-PRF-19500/620L
w/AMENDMENT 1



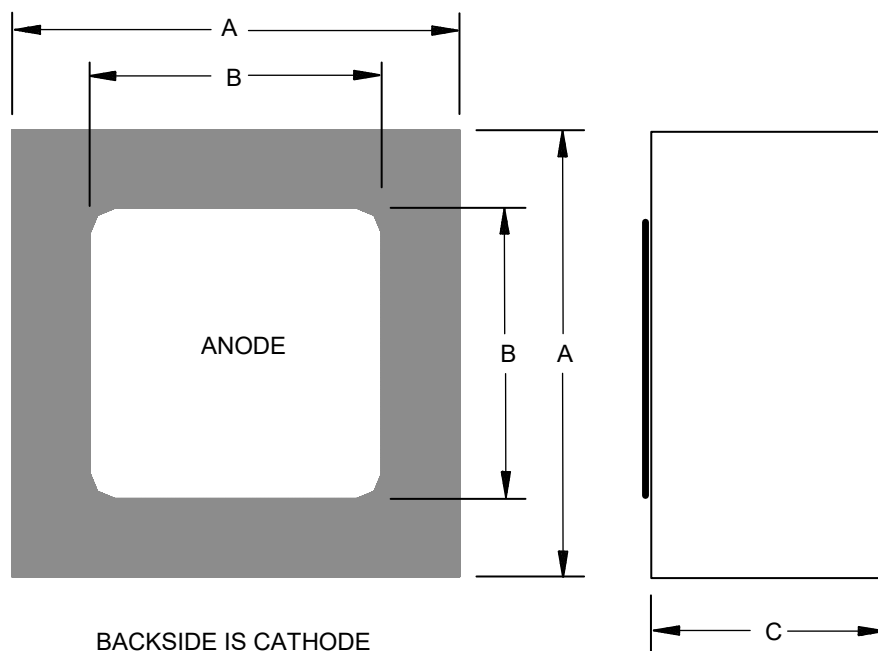
Symbol	Inches	Inches	mm	mm	Symbol	Inches	Inches	mm	mm
	Min	Max	Min	Max		Min	Max	Min	Max
BH	.079	.091	2.01	2.31	LW1	.053	.057	1.35	1.45
BL	.205	.22	5.21	5.59	LW2	.02	.026	0.51	0.66
BW	.137	.148	3.48	3.76	LW3	.019	.021	0.48	0.53
CL	.196	.206	4.98	5.23	LE	.022	.032	0.56	0.81
CW	.126	.136	3.20	3.45	r1		.008		0.20
LL	.052	.058	1.32	1.47	r2		.006		0.15
LS1	.178	.184	4.52	4.67					
LS2	.088	.094	2.24	2.39					

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Pad 3 = shielding, connected to the lid.
3. In accordance with ASME Y14.5, diameters are equivalent to ϕ x symbology.
4. Equivalent pad layout to 1N5822US.
5. Cathode marked with a square.

* FIGURE 3. Physical dimensions of surface mount 1N5822UDB.

MIL-PRF-19500/620L
w/AMENDMENT 1



Symbol	Inches	Inches	mm	mm
	Min	Max	Min	Max
A	.062	.064	1.57	1.63
B	.052	.054	1.32	1.37
C	.008	.012	0.20	0.31

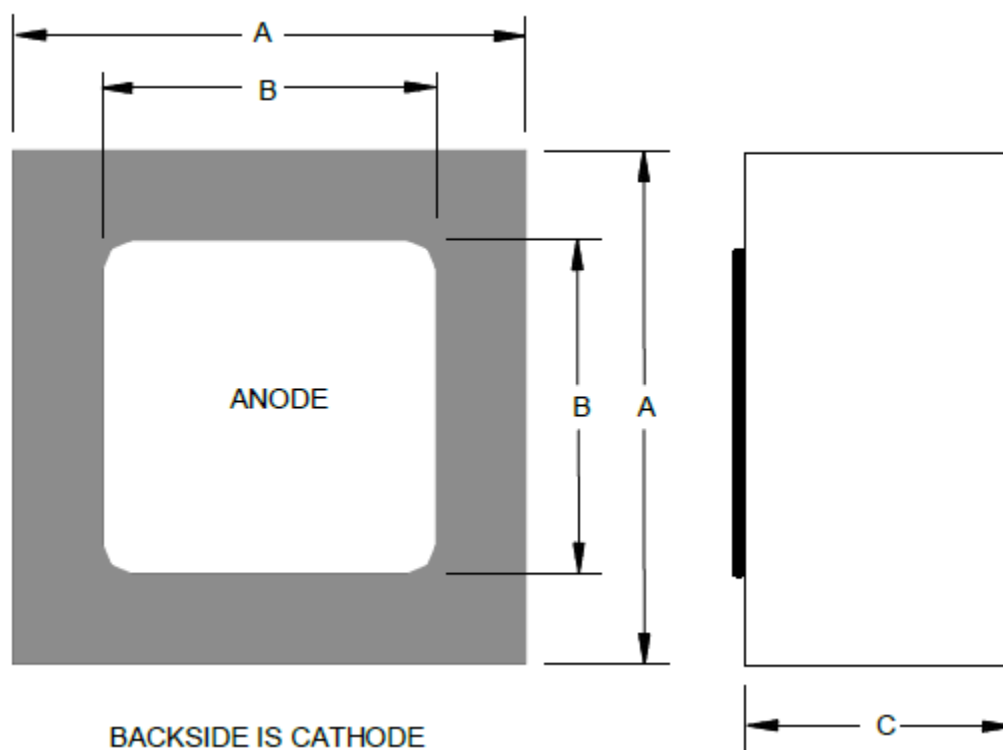
Design data

Metallization:

Top: (Anode) Al
Back: (Cathode) Au

Al thickness 25,000 Å minimum.
Gold thickness 4,000 Å minimum.

* FIGURE 4. JANC (A-version) die dimensions.



Ltr	Inches	Inches	mm	mm
	Min	Max	Min	Max
A	.066	.070	1.68	1.79
B	.061	.065	1.55	1.65
C	.008	.012	0.20	0.30

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. The physical characteristics of the die are:
Metallization:
Top (anode): Al, 21,000 Å Minimum
Back (cathode): Au, 3,750 Å Minimum
Chip thickness: .010 inches (0.25 mm) $\pm$.002 inches (0.05 mm).

* FIGURE 5. JANC (B-version) die dimensions.

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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

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

DEPARTMENT OF DEFENSE STANDARDS

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

(Copies of these documents are available online at <https://quicksearch.dla.mil>.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).

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

* 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figures 1 (axial leads), 2 (surface mount), 3 (surface mount), 4 (die), and 5 (die).

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).

3.4.2 Diode construction. These devices shall be metallurgically bonded-thermally-matched-noncavity-double plug construction, utilizing a category I or III bond, in accordance with MIL-PRF-19500, except for JANHC and JANKC.

3.4.3 Surface mount. The surface mount US version shall be considered structurally identical to the non-surface mount version except for lead attach.

MIL-PRF-19500/620L
w/AMENDMENT 1

3.5 Marking. Marking shall be in accordance with [MIL-PRF-19500](#). No color coding shall be permitted for part numbering.

3.5.1 Marking for surface mount (US) devices. For US version devices only, all marking, except polarity may be omitted from the body. At the option of the manufacturer, US surface mount devices may include laser marking on an end-cap, to include part number and lot date code for all levels. JANS devices which are laser marked shall also include serialization. The prefixes JAN, JANTX, JANTXV, or JANS may be abbreviated as J, JX, JV, or JS, respectively. (Example: The PIN may be reduced to JS5822). All marking, except for serial number and polarity shall appear on the initial container.

3.5.2 Polarity. The polarity of all types shall be indicated with a contrasting color band to denote the cathode end. Alternatively, polarity marking of US devices shall consist of as a minimum, a band or three contrasting dots around the periphery of the cathode.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in [1.3](#), [1.4](#), and [table I](#).

3.7 Electrical test requirements. The electrical test requirements shall be as 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.

4. VERIFICATION

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

- a. Qualification inspection (see [4.2](#)).
- b. Screening (see [4.3](#)).
- c. Conformance inspection (see [4.4](#)).
- d. Element evaluation of un-encapsulated die (see [4.6](#)).

4.2 Qualification inspection. Qualification inspection shall be in accordance with [MIL-PRF-19500](#) and as specified herein.

4.2.1 Group E qualification. Group E inspection shall be performed for qualification or requalification only. In case qualification was awarded to a prior revision of the specification sheet that did not require 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 JANHC and JANKC devices. Qualification for JANHC and JANKC devices shall be in accordance with [MIL-PRF-19500](#). This testing may be performed in a TO-5 package in lieu of the axial leaded package.

MIL-PRF-19500/620L
w/AMENDMENT 1

* 4.3 Screening (quality levels JANS, JANTXV, and JANTX 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 table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen	Measurements for JANS level	Measurements for JANTXV and JANTX level
2	Not required	Not required
3b (1) 3c	Not applicable Required (see 4.5.4)	Not applicable Required (see 4.5.4)
4, 5, and 6	Not applicable	Not applicable
8	Required	Not required
9	Required; I_{R1} and V_{FM2}	Not applicable
(2) 10	Required 1N5822, $T_A = +90^\circ\text{C}$; $V_{RWM} = 40\text{ V(pk)}$; 1N6864, $T_A = +80^\circ\text{C}$; $V_{RWM} = 80\text{ V(pk)}$; $V_{RWM} = \text{half sine wave, } f = 60\text{ Hz}$	Required 1N5822, $T_A = +90^\circ\text{C}$; $V_{RWM} = 40\text{ V(pk)}$; 1N6864, $T_A = +80^\circ\text{C}$; $V_{RWM} = 80\text{ V(pk)}$; $V_{RWM} = \text{half sine wave, } f = 60\text{ Hz}$
11	Required $\Delta I_{R1} \leq 100$ percent of initial reading or 0.05 mA whichever is greater; $\Delta V_{FM2} \leq \pm 50\text{ mV dc}$	Required; I_{R1} and V_{FM2}
12	See 4.3.2	$t = 96$ hours. See 4.3.2
13	Required Subgroup 2 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 0.05 mA whichever is greater; $\Delta V_{FM2} \leq \pm 50\text{ mV dc}$	Required Subgroup 2 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 0.05 mA whichever is greater; $\Delta V_{FM2} \leq \pm 50\text{ mV dc}$

- (1) Thermal impedance shall be performed anytime after temperature cycling, screen 3a, JANTX and JANTXV levels do not need to be repeated in screening requirements.
- (2) Junction temperature (T_J) is not to exceed 115°C at V_{RWM} . T_J is affected by the device mounting thermal resistance when parasitic power is generated by the temperature dependent leakage current. Until this leakage becomes significant near thermal runaway, T_J remains approximately equal to T_A or T_J for $I_O = 0$.

4.3.1.1 JAN testing. JAN level product shall have temperature cycling and thermal impedance testing performed in accordance with MIL-PRF-19500, JANTX level screening level requirements. Electrical testing shall be in accordance with table I, subgroup 2 herein.

4.3.2 Burn-in conditions. Burn-in conditions are as follows: $I_F = 3.0\text{ A dc (min)}$. Mounting and test conditions shall be in accordance with method 1038 of MIL-STD-750, test condition B.

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

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with table E-V of MIL-PRF-19500, and table I herein.

MIL-PRF-19500/620L
w/AMENDMENT 1

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, JANTXV, and JANTX) of [MIL-PRF-19500](#) and as follows.

4.4.2.1 Quality level JANS.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	1056	0°C to 100°C, 25 cycles, n = 22, c = 0.
B3	1051	-55°C to 150°C, 100 cycles, n = 22, c = 0.
B3	4066	Condition A2; $I_{FSM} = 80$ A (pk), $I_O = 3$ A dc; T_A = room ambient as defined in 4.5 of MIL-STD-750 ; five surges of 8.3 ms each at 1 minute intervals.
B4	1037	$I_F = 3.0$ A dc; T_A = room ambient as defined in the general requirements of MIL-STD-750 ; $t_{on} = t_{off} = 3$ minutes minimum for 2,000 cycles.
B5	1026	$I_F = 3$ A dc minimum, adjust I_F or T_A to achieve $T_J = +125^\circ\text{C}$ minimum.

4.4.2.2 Quality levels JAN, JANTX and JANTXV.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B2	1056	0°C to 100°C, 10 cycles, n = 22, c = 0.
B2	1051	-55°C to 150°C, 25 cycles, n = 22, c = 0.
B2	4066	Condition A2; $I_{FSM} = 80$ A (pk), $I_O = 3$ A dc; T_A = room ambient as defined in 4.5 of MIL-STD-750 ; five surges of 8.3 ms each at 1 minute intervals.
B3	1027	$I_F = 3$ A dc minimum, adjust I_F or T_A to achieve $T_J = +125^\circ\text{C}$.
B4	2075	As applicable.

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](#).

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Axial devices: Tension: Test condition A; weight = 20 pounds (9 Kg); t = 15 seconds. Lead fatigue: Test condition E; weight 1 pound (0.45 Kg).
* C2	2038	US devices: Test condition B; weight = 20 pounds (9 Kg); t = 15 seconds. (Not applicable for UDB suffix devices.)
C5	4081	See 4.5.5 herein.
C6	1027	$I_F = 3$ A dc minimum, adjust I_F or T_A to achieve $T_J = +125^\circ\text{C}$ minimum.
C8		Affirmation testing in accordance with 4.5.3 herein. For quality level JANS hard glass US package devices only. n = 45, c = 0.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E-IX of [MIL-PRF-19500](#), and [table II](#) herein.

MIL-PRF-19500/620L
w/AMENDMENT 1

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

4.5.1 Pulse measurements. The conditions for pulse measurement shall be as specified in section 4 of [MIL-STD-750](#).

4.5.2 Steady-state operation life. This test shall be conducted with a half-sine wave of the specified peak voltage impressed across the diode in the reverse direction followed by a half-sine waveform of the specified average rectified current. The forward conduction angle of the rectified current shall not be greater than 180 degrees nor less than 150 degrees.

4.5.3 Affirmation testing. Affirmation testing shall consist of the tests specified below. The tests shall be performed in the sequence listed as follows:

- a. End-point electrical tests in accordance with subgroup 2 of [table I](#) (group A) herein.
- b. Preheat the device within 100°C of solder temperature before immersion into molten solder.
- c. Immersion of the body of the device in molten solder at a temperature of 245°C for 5 seconds minimum.
- d. Temperature cycling in accordance with condition G of method 1051 of [MIL-STD-750](#) for 20 cycles.
- e. End-point electrical tests in accordance with subgroup 2 of [table I](#) herein.

4.5.4 Thermal impedance measurements. The thermal impedance measurements shall be performed in accordance with method 3101 or 4081 of [MIL-STD-750](#), as applicable, using the guidelines in that method for determining I_H and I_M .

4.5.4.1 Screening of encapsulated devices. The thermal impedance limit ($Z_{\theta JX}$) shall be less than the process determined statistical maximum limit as outlined in method 3101 or 4081 of [MIL-STD-750](#), as applicable. See group E, subgroup 4 of [table II](#) herein.

4.5.4.2 Group A inspection. The following test conditions shall be used for group A inspection:

- a. I_M measurement current:..... 1 mA to 10 mA.
- b. I_H forward heating current: 3A.
- c. t_H heating time:..... 10 ms.
- d. t_{MD} measurement delay time:.....70 μ s maximum.

4.5.5 Thermal resistance. Thermal resistance measurement shall be in accordance with method 3101 or 4081 of [MIL-STD-750](#). Forced moving air or draft shall not be permitted across the device during test. The maximum limit for $R_{\theta JL}$ under these test conditions shall be $R_{\theta JL}(\max) = 30^\circ\text{C/W}$, $R_{\theta JEC}(\max) = 10^\circ\text{C/W}$. The following conditions shall apply when using method 3101:

- a. I_M measurement current:..... 1mA to 10mA.
- b. I_H forward heating current: 3A minimum.
- c. t_H heating time:.....25 seconds minimum.
- d. t_{MD} measurement delay time:.....70 μ s maximum.

4.6 Element evaluation of un-encapsulated die. The element evaluation of un-encapsulated die shall be in accordance with appendix G of [MIL-PRF-19500](#).

MIL-PRF-19500/620L
w/AMENDMENT 1

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 examination	2071					
<u>Subgroup 2</u> Thermal impedance <u>2/</u> 1N5822, 1N5822US, 1N6864, 1N6864US 1N5822UDB	3101	See <u>4.5.4</u>	$Z_{\theta JX}$		2.5 6.2	°C/W °C/W
Forward voltage 1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, pulsed (see <u>4.5.1</u>); $I_{FM} = 1.0$ A (pk)	V_{FM1}		0.40 0.50	V V
Forward voltage 1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, pulsed (see <u>4.5.1</u>); $I_{FM} = 3.0$ A (pk)	V_{FM2}		0.50 0.70	V V
Forward voltage 1N5822, 1N5822US	4011	Condition B, pulsed (see <u>4.5.1</u>); $I_{FM} = 9.4$ A (pk)	V_{FM3}		0.70	V
Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	Condition A or B; pulsed (see <u>4.5.1</u>) $V_{RM} = 40$ V (pk) $V_{RM} = 80$ V (pk)	I_{RM1}		0.10 0.15	mA mA
<u>Subgroup 3</u> High temperature operation: Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	$T_A = +100^\circ\text{C}$ Condition A or B; pulsed (see <u>4.5.1</u>) $V_{RM} = 40$ V (pk) $V_{RM} = 80$ V (pk)	I_{RM2}		12.5 18.0	mA mA
Forward voltage 1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, $I_F = 3.0$ A (pk) pulse method (see <u>4.5.1</u>)	V_{FM4}		0.47 0.65	V V
Low temperature operation: Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	$T_A = -55^\circ\text{C}$ Condition A or B; pulsed (see <u>4.5.1</u>) $V_{RM} = 40$ V (pk) $V_{RM} = 80$ V (pk)	I_{RM3}		0.40 0.55	mA mA
Forward voltage 1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, $I_F = 3.0$ A (pk) pulse method (see <u>4.5.1</u>)	V_{FM5}		0.62 0.80	V V
<u>Subgroup 4, 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).

MIL-PRF-19500/620L
w/AMENDMENT 1

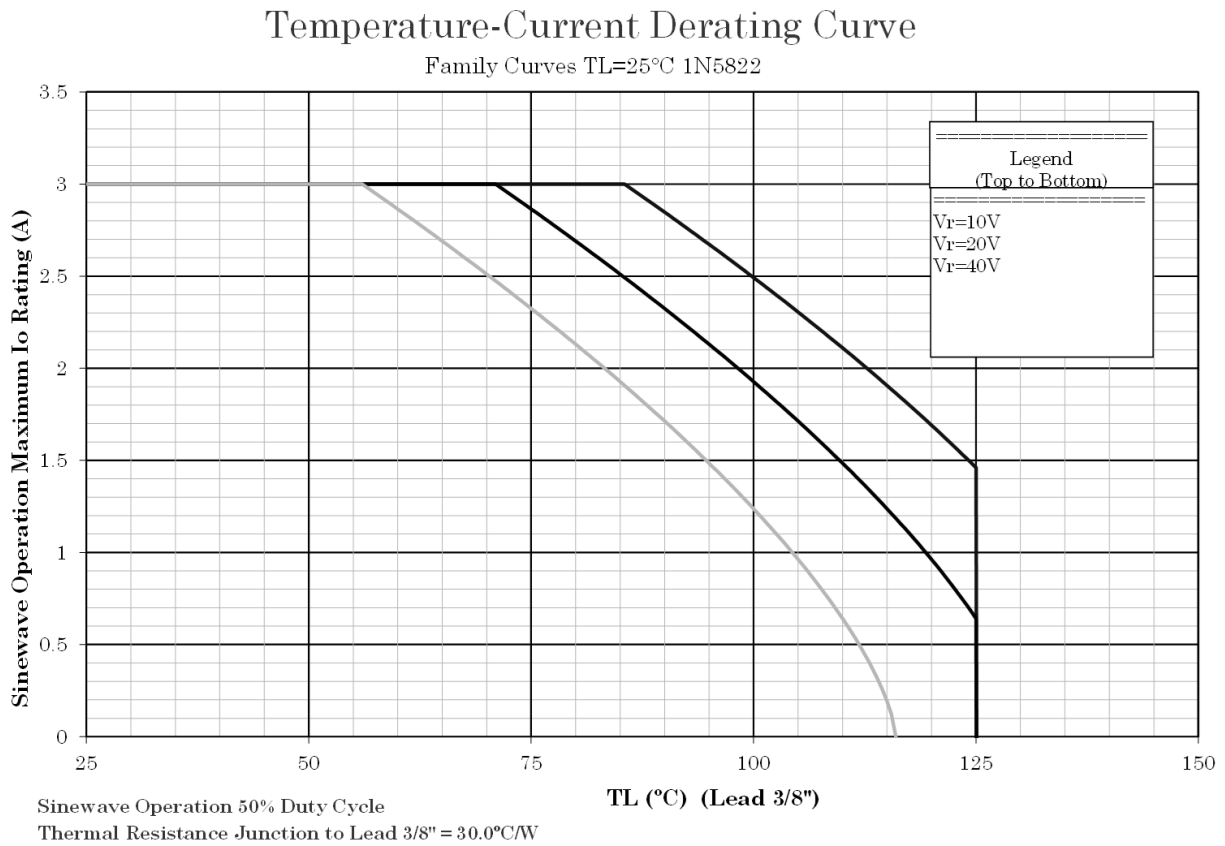
Group B, subgroups 2 and 3 (JAN, JANTX, JANTXV).
Group C, subgroups 2 and 6.
Group E, subgroup 1.

MIL-PRF-19500/620L
w/AMENDMENT 1

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

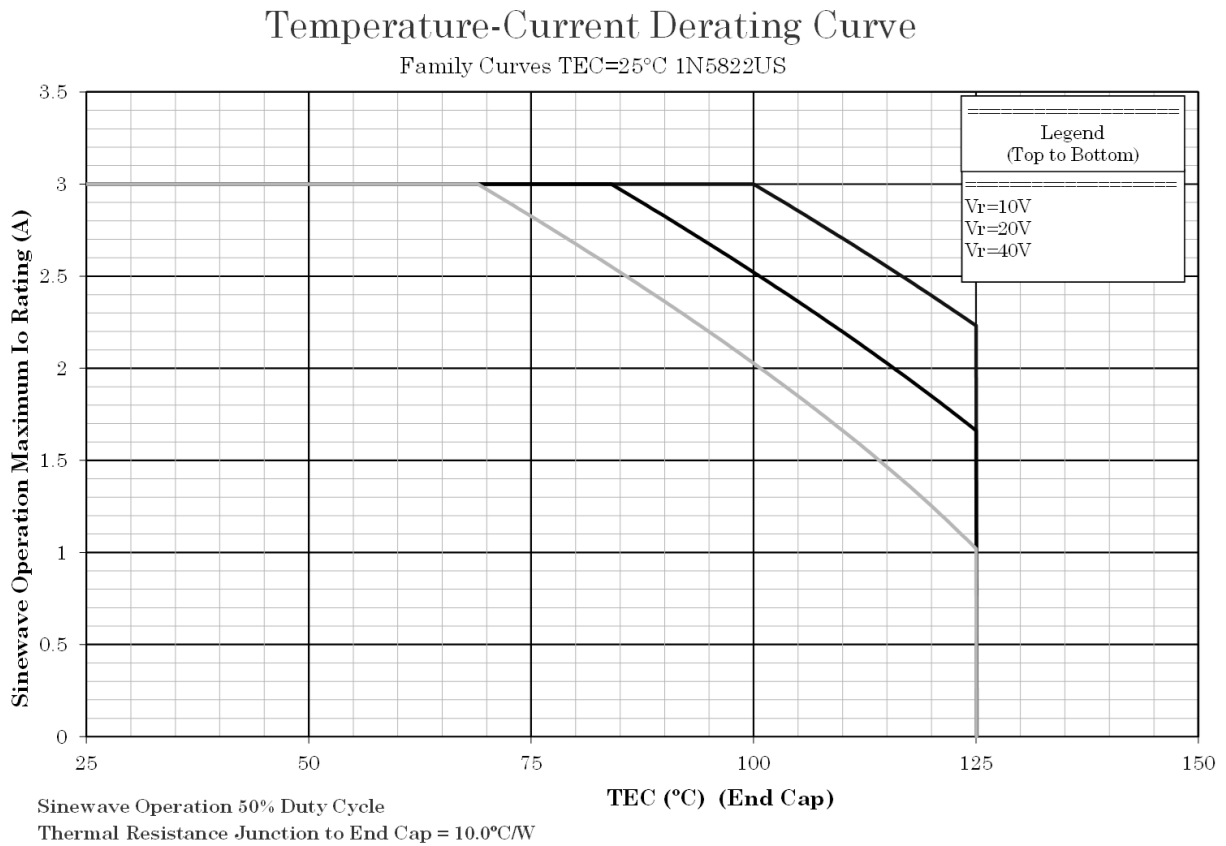
Inspection	MIL-STD-750		Sampling plan
	Method	Conditions	
<u>Subgroup 1</u>			n = 45, c = 0
Temperature cycling	1051	-65°C to 150°C, 500 cycles.	
Hermetic seal	1071	Test condition E.	
Electrical measurement		See table I , subgroup 2.	
<u>Subgroup 2</u>			n = 22, c = 0
Intermittent operating life	1036	10,000 cycles.	
Electrical measurement		See table I , subgroup 2.	
<u>Subgroup 4</u>			n = 45
Thermal impedance curves		See subgroup 4 of table E-IX (group E) of MIL-PRF-19500 .	
<u>Subgroup 5</u>			
Not applicable			
<u>Subgroup 6</u>			n = 100, c = 0
ESD	1020		
<u>Subgroup 8</u>			
Resistance to glass cracking	1057	Test to destruction or 25 cycles max, whichever comes first. Not applicable for UDB devices.	
<u>Subgroup 10</u>			
Affirmation testing		See 4.5.3 . For quality level JANS hard glass US package devices only.	

*



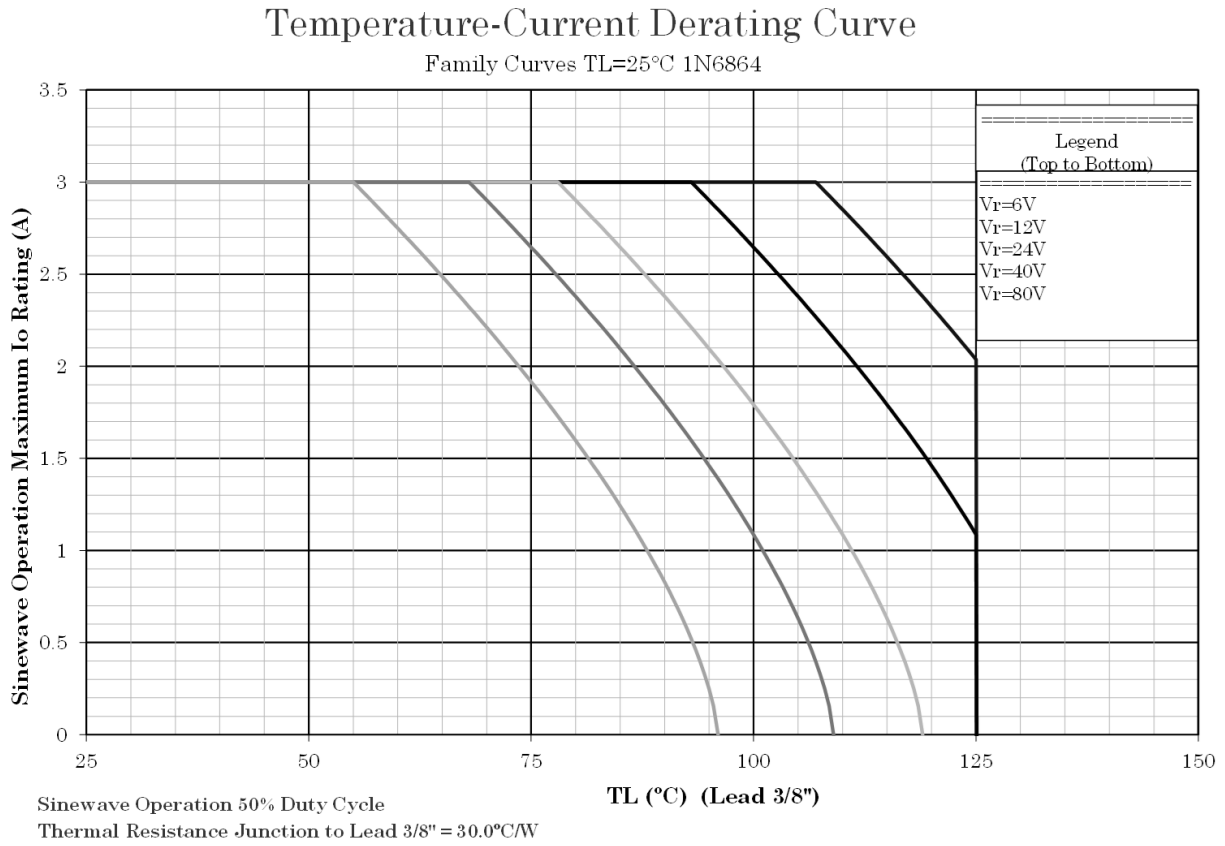
NOTE: This temperature-current derating curve varies with applied voltage.

FIGURE 6. Temperature-current derating for 1N5822.



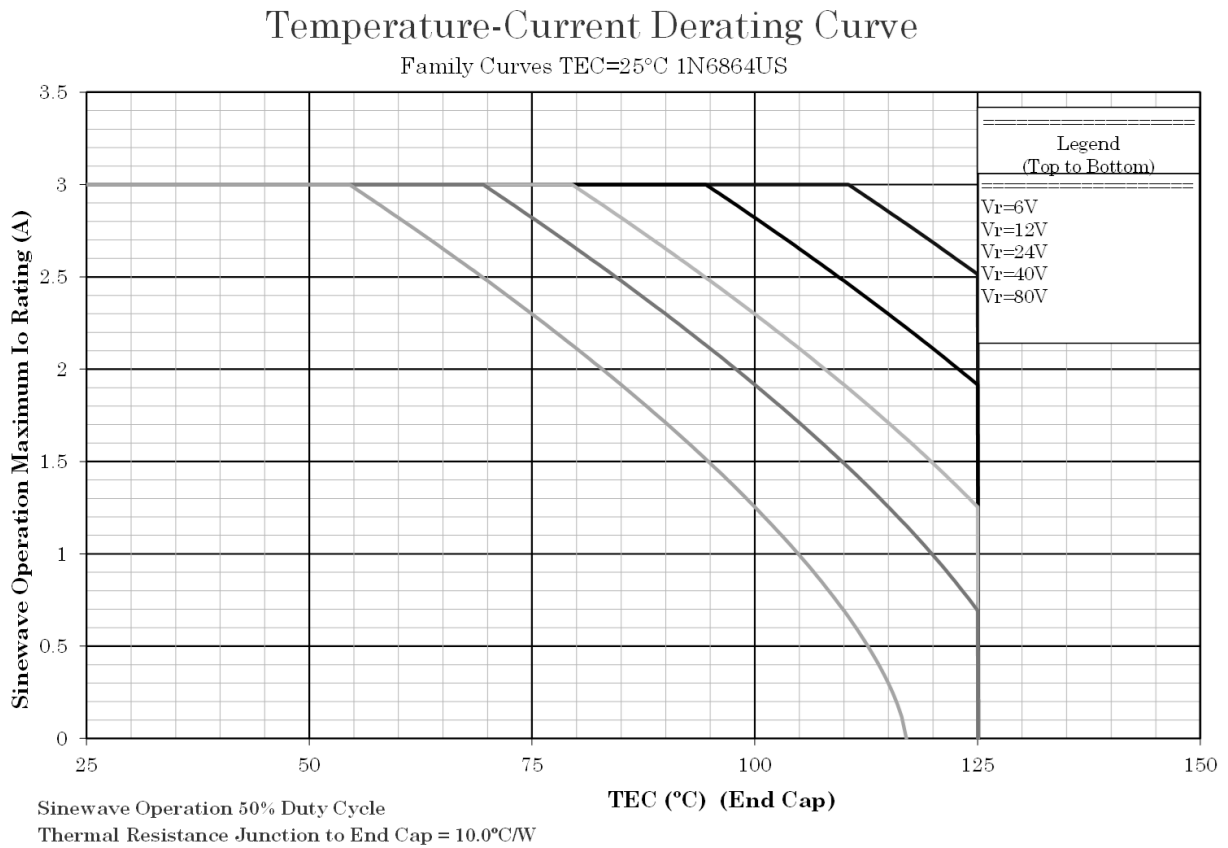
NOTE: This temperature-current derating curve varies with applied voltage.

FIGURE 7. Temperature-current derating for 1N5822US.



NOTE: This temperature-current derating curve varies with applied voltage.

FIGURE 8. Temperature-current derating for 1N6864.



NOTE: This temperature-current derating curve varies with applied voltage.

FIGURE 9. Temperature-current derating for 1N6864US.

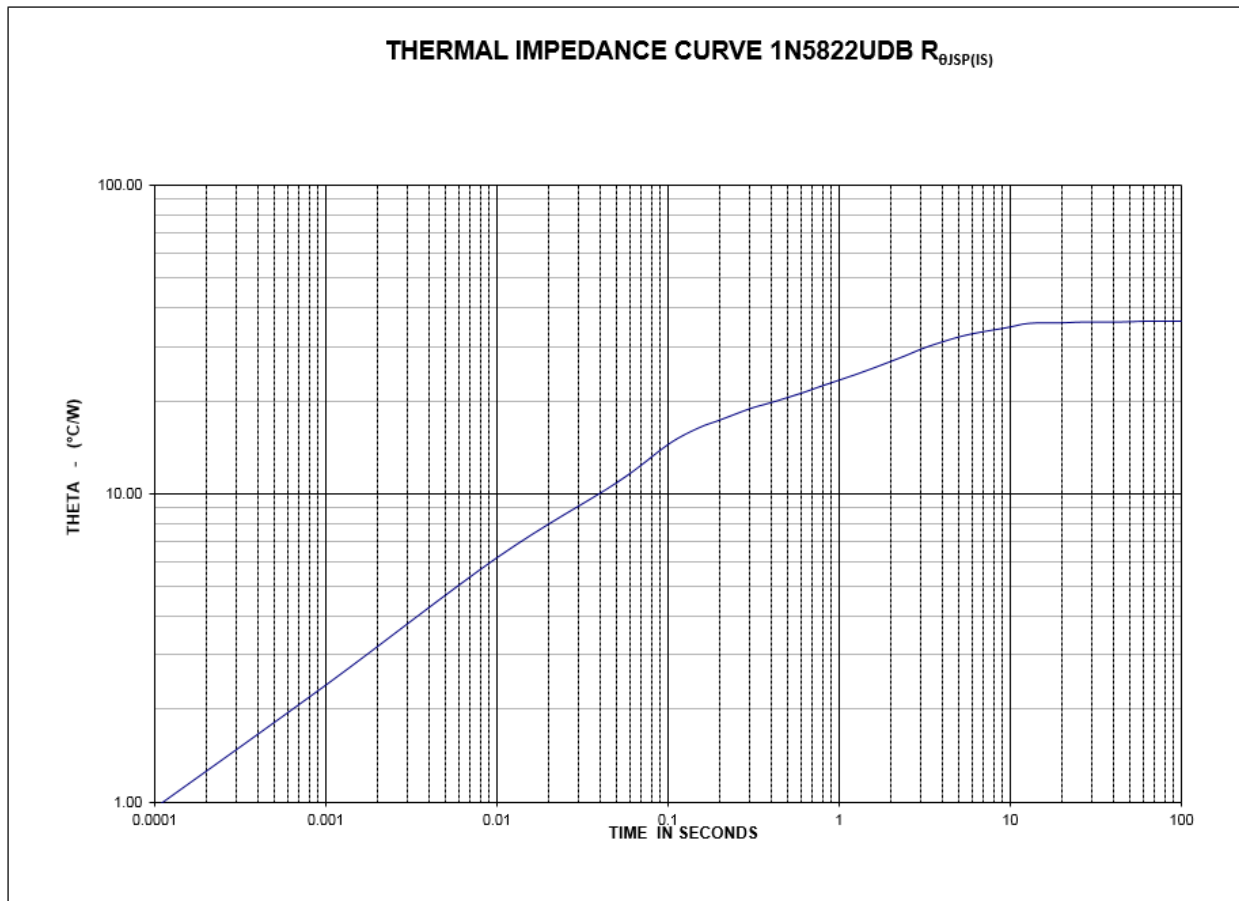


Figure 10. Thermal impedance (1N5822UDB)

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.

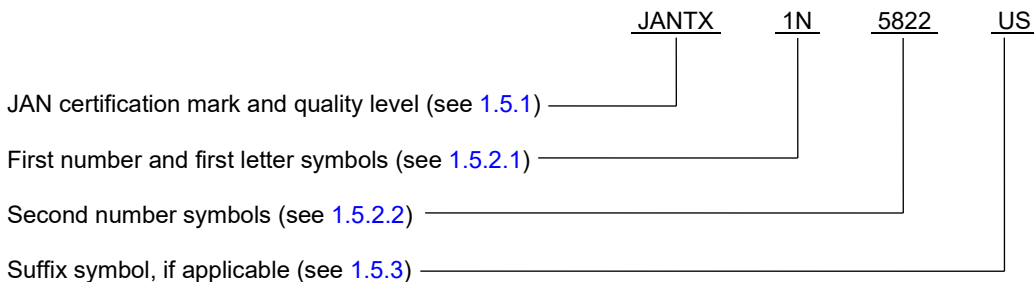
6.2 Acquisition requirements. The acquisition requirements should specify the following.

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. The complete PIN, see 1.5 and 6.4.

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

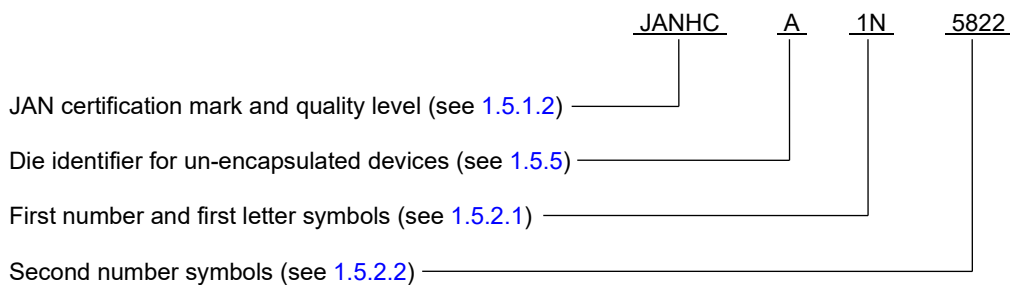
6.4 PIN construction examples. The PINs for encapsulated and un-encapsulated devices and are constructed using the following forms.

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



MIL-PRF-19500/620L
w/AMENDMENT 1

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



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

	PINs for devices of the base quality level	PINs for devices of the "TX" quality level	PINs for devices of the "TXV" quality level	PINs for devices of the "S" quality level
Axial Package	JAN1N5822	JANTX1N5822	JANTXV1N5822	JANS1N5822
	JAN1N6864	JANTX1N6864	JANTXV1N6864	JANS1N6864
US Package	JAN1N5822US	JANTX1N5822US	JANTXV1N5822US	JANS1N5822US
	JAN1N6864US	JANTX1N6864US	JANTXV1N6864US	JANS1N6864US
UDB Package	JAN1N5822UDB	JANTX1N5822UDB	JANTXV1N5822UDB	JANS1N5822UDB

* 6.5.1 List of PINs for un-encapsulated devices. The following is a list of possible PINs available on this specification sheet for un-encapsulated die. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA1N5822) will be identified on the QML.

JANHC and JANKC ordering information		
PIN	Manufacturer	Manufacturer
	43611	52GC4
1N5822	JANHCA1N5822, JANKCA1N5822	JANHCB1N5822, JANKCB1N5822
1N6864	JANHCA1N6864, JANKCA1N6864	

6.6 Applications data.

6.6.1 Square-wave application with 1N5822US. For a printed board mounting example with FR-4 base material to support a 2 amp I_o square wave switching at a 0.50 duty factor (50 percent duty cycle) at $T_J = 100^\circ\text{C}$ and ambient temperature of 50°C , the following steps guide the user in calculating what the printed board copper mounting pad size needs to be with 1 ounce, 2 ounce, and 3 ounce copper foil.

- a. Locate the size of copper mounting pads on standard FR-4 base material to support operation at 2 A average square wave switching at a 0.50 duty factor (50 percent duty cycle) at $T_J = 100^\circ\text{C}$ with $T_A = 50^\circ\text{C}$.
- b. Calculate peak $I_F = 2 \text{ A} / 0.50 \text{ duty factor} = 4 \text{ A}$.
- c. Use the V_F versus I_F curve on figures 11 and 12 to look up $I_F = 4 \text{ A}$ (Y-axis) and follow across to the $T_J = 100^\circ\text{C}$ curve (middle) for $V_F = 0.39 \text{ V}$.
- d. Calculate power = $I_F * V_F * \text{duty factor} = 4 * 0.39 * 0.50 = 0.78 \text{ W}$.
- e. Calculate maximum thermal resistance needed $(100^\circ\text{C} - 50^\circ\text{C}) / 0.78 \text{ W} = 64^\circ\text{C/W}$.
- f. Locate the thermal resistance of 64°C/W on the Y-axis using a thermal resistance versus copper mounting pad area plot on one of the three curves on figure 13 for different weights of copper foil and then intersect curve horizontally determine the answer. Curves assume still air and horizontal printed board position.
- g. In this example, the copper mounting pad sizes for the different copper foil weights would be as follows:
 - 1) .026 inch² (16.77 mm²) for 1 ounce copper foil.
 - 2) .16 inch² (103.23 mm²) for 2 ounce copper foil.
 - 3) .1 inch² (64.52 mm²) for 3 ounce copper foil.
- h. A conservative pad guard-band is optional since $T_J \geq 125^\circ\text{C}$. Multilayer printed boards or forced air cooling will improve performance. Closed confinement of the printed board will do the opposite.

Schottky $V_F - I_F$ characteristics 1N5822

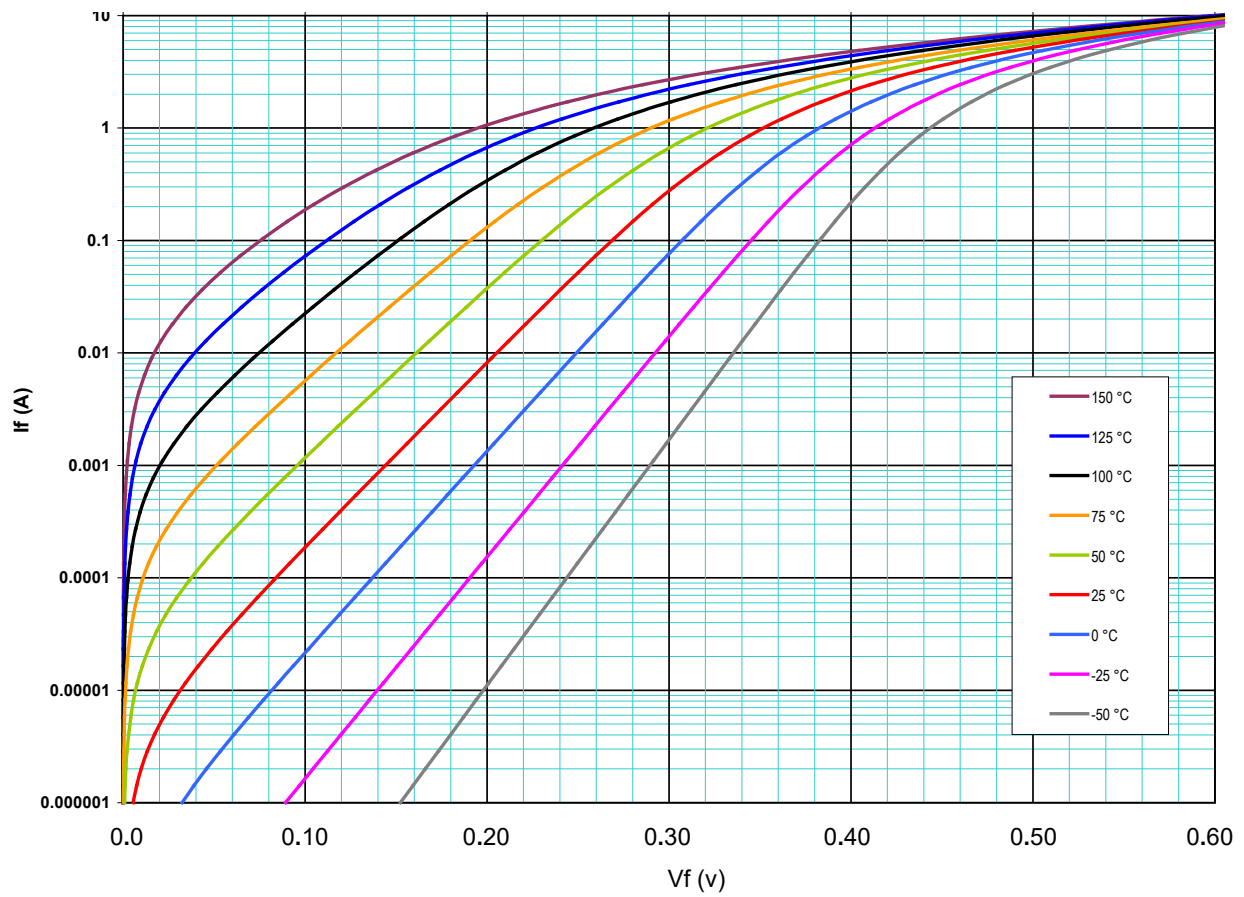


FIGURE 11. V_F versus I_F curve.

Schottky V_F – I_F characteristics 1N6864

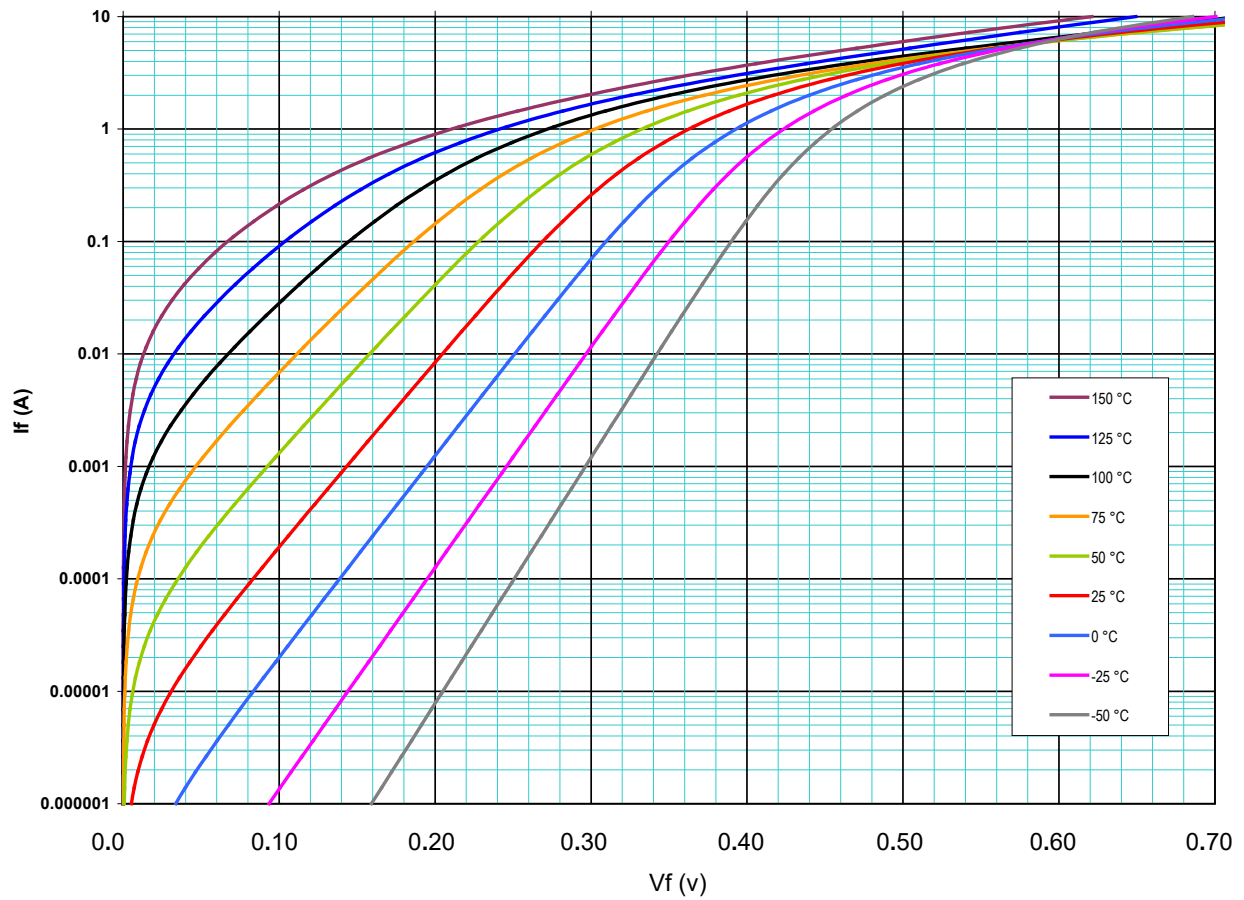


FIGURE 12. V_F versus I_F curve.

**AXIAL / US THERMAL RESISTANCE versus FR4 PAD AREA
STILL AIR with the PCB HORIZONTAL**

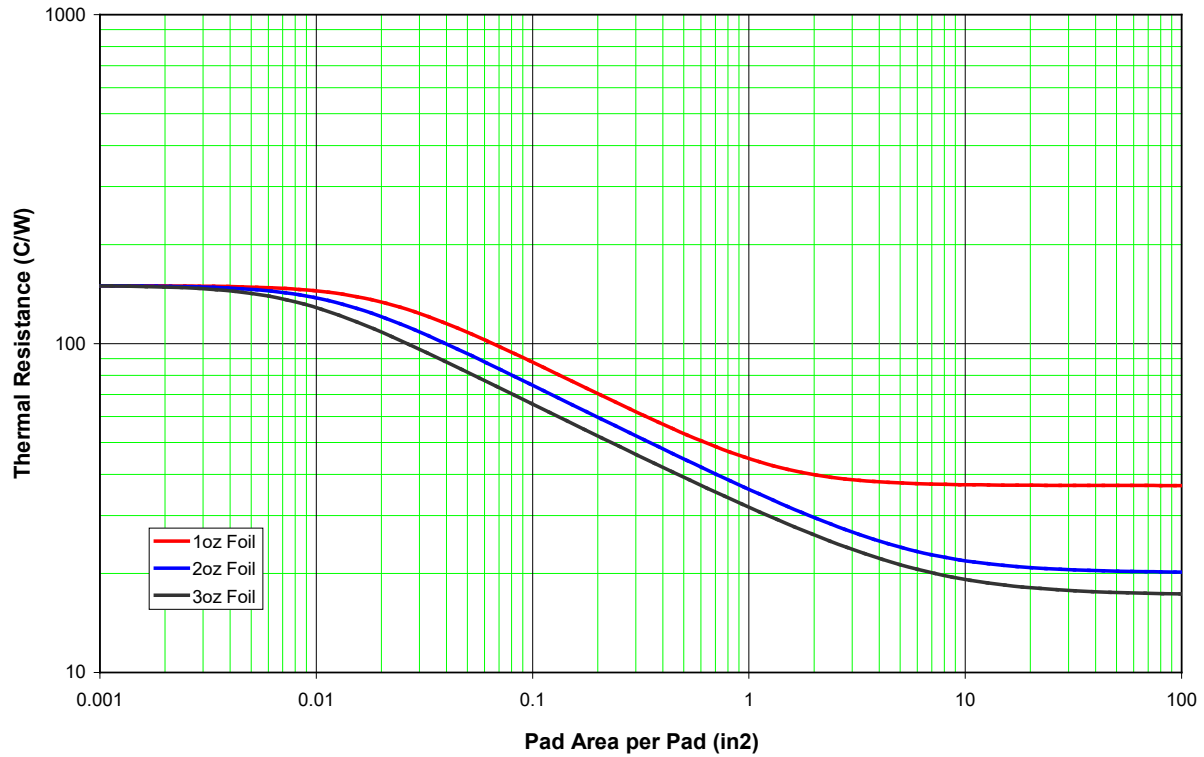


FIGURE 13. Thermal resistance calculator (Junction to Ambient on PCB).

MIL-PRF-19500/620L
w/AMENDMENT 1

6.7 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.

* 6.8 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 – SH
Air Force – 85
NASA – NA
DLA – CC

Preparing activity:
DLA – CC

(Project 5961-2022-062)

Review activities:

Army – AR, MI, SM
Navy – AS, MC
Air Force – 19

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>.