

The documentation and process conversion measures necessary to comply with this revision shall be completed by 25 October 2016.

INCH-POUND

MIL-PRF-19500/620K
25 July 2016
SUPERSEDING
MIL-PRF-19500/620J
28 February 2014

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, HERMETIC, DIODE, SILICON, RECTIFIER,
SCHOTTKY BARRIER, TYPES 1N5822, 1N6864,
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 for die (element evaluation).

* 1.2 Package outlines and die topography. The device package for the encapsulated device type are as follows: Axial in accordance with [figure 1](#), and surface mount version US in accordance with [figure 2](#). The dimensions and topography for JANHC and JANKC unencapsulated die are as follows: A version die in accordance with [figure 3](#).

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

Types	V_{RWM} (1) (2)	I_O (1) (2)	I_{FSM}	$Z_{\theta JX}$	$R_{\theta JL}$.375 inch (9.52 mm) Lead length	$R_{\theta JEC}$	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</u>	<u>°C</u>
1N5822, 1N5822US	40	3.0	80	2.5	30	10	-65 to	-65 to
1N6864, 1N6864US	80	3.0	80	2.5	30	10	+150	+125

- (1) See figures 4, 5, 6, and 7 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 = FR4 .0625 inch (1.59mm) pad; area of each pad = .4 square inch (258.06 square mm).

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

AMSC N/A

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

Types	V _{FM1}	V _{FM2}	V _{FM3}	I _{RM}		R _{θJL} .375 inch (9.52 mm) Lead length	R _{θJEC}
	I _{FM} = 1.0 A	I _{FM} = 3.0 A	I _{FM} = 9.4 A	V _{RM} = 40 V dc (1N5822) V _{RM} = 80 V dc (1N6864) pulsed method (see 4.5.1)			
	<u>V (pk)</u>	<u>V (pk)</u>	<u>V (pk)</u>	T _J = +25°C <u>I_{RM1}</u>	T _J = +100°C <u>I_{RM2}</u>	<u>°C/W</u>	<u>°C/W</u>
1N5822	.40	.50	.70	.10	12.5	30	
1N5822US	.40	.50	.70	.10	12.5		10
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 a through-hole mount axial package (see figure 1).
US	Indicates a surface mount package with square endcaps (see figure 2).

* 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 identifier that is applicable for this specification sheet is "A", (see figure 3 and 6.5.1).

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.

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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

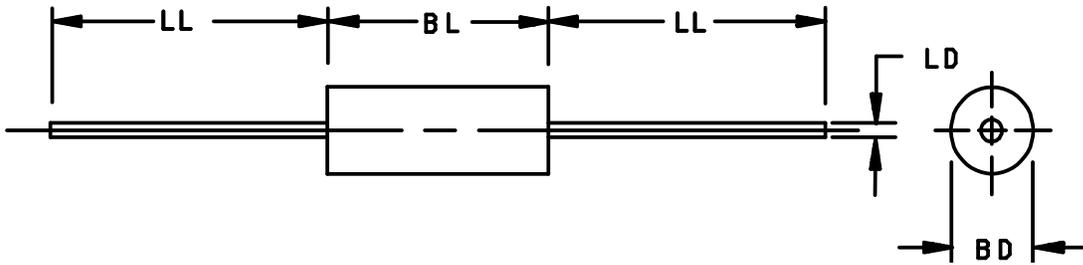
[MIL-PRF-19500](#) - Semiconductor Devices, General Specification for.

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.

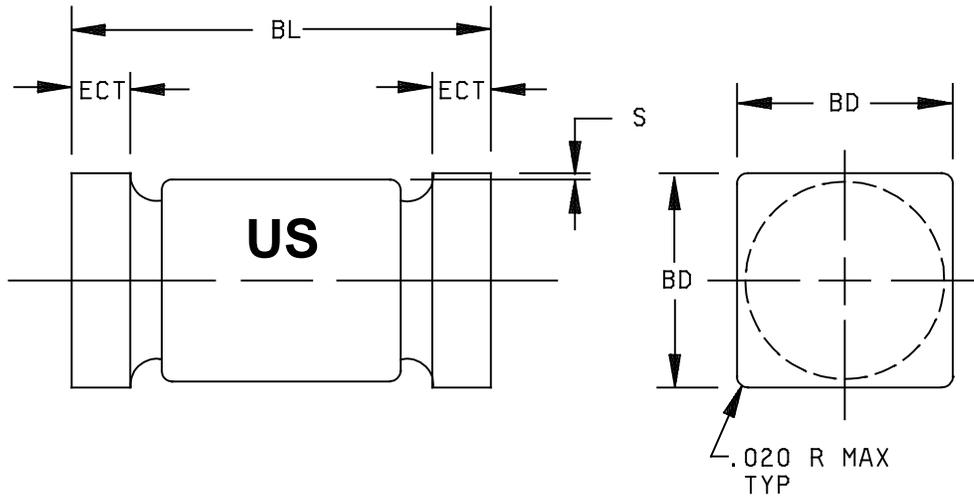


Dimensions				
Symbol	Inches		Millimeters	
	Min	Max	Min	Max
BD	.115	.145	2.92	3.68
BL	.130	.195	3.30	4.95
LD	.036	.042	0.91	1.07
LL	.900	1.300	22.86	33.02

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

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

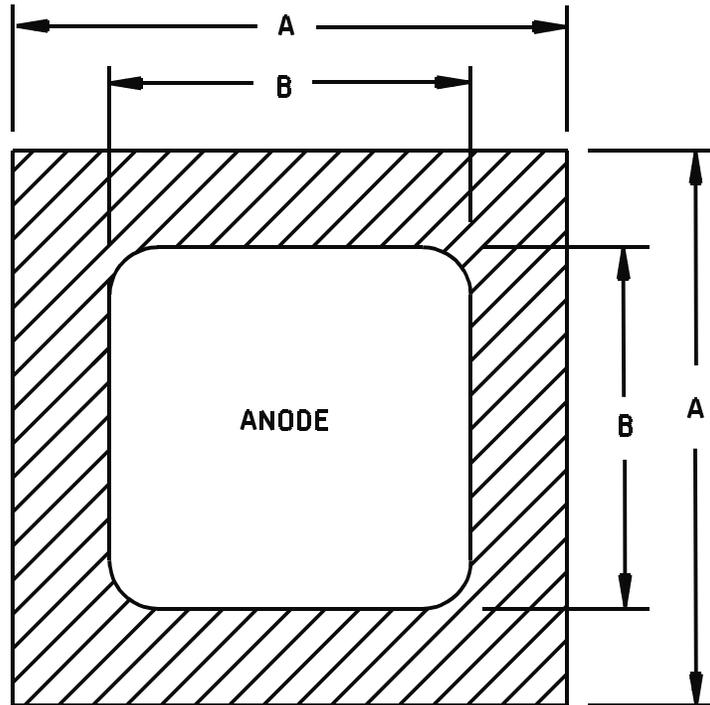


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.137	.148	3.48	3.76
BL	.200	.225	5.08	5.72
ECT	.019	.028	0.48	0.71
S	.003		0.08	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

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



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.062	.064	1.57	1.63
B	.052	.054	1.32	1.37

Design data

Metallization:

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

Al thickness 25,000 Å minimum.
 Gold thickness 4,000 Å minimum.
 Chip thickness .010 inch (0.254 mm) ± .002 (±.051 mm).

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

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), and 3 (die).

3.4.1 Lead material and finish. Lead material shall be copper clad steel with a minimum of 70 percent copper by weight. 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.

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

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. Polarity marking of US devices shall consist of as a minimum, a band or three contrasting dots around the periphery of the cathode. 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 part number may be reduced to JS5822). All marking, except for serial number and polarity shall appear on the initial container.

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](#) and [table I](#) herein).

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.

* 4.3 Screening

* 4.3.1 Screening (JANS, JANTXV, and JANTX levels 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	Measurement	
	JANS level	JANTXV and JANTX level
2	Not required	Not required
3b (1) 3c	Not applicable Required (see 4.3.3)	Not applicable Required (see 4.3.3)
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 will 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: $I_F = 3.0$ A dc (min). Mounting and test conditions shall be in accordance with method 1038 of [MIL-STD-750](#), test condition B.

4.3.3 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 . 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.

4.3.4 Screening (JANHC or JANKC). Screening of die shall be in accordance with [MIL-PRF-19500](#). As a minimum, die shall be 100-percent probed in accordance with [table I](#), subgroup 2, except for thermal impedance.

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. The following test conditions shall be used for $Z_{\theta JX}$, group A inspection:

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

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

4.4.2.1 Quality level JANS (see table E-VIA of [MIL-PRF-19500](#)).

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	1056	-55°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	$I_{FSM} = 80$ A (pk), condition A 2, $I_O = 3$ 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 (see table E-VIB of MIL-PRF-19500).

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B2	1056	-55°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	$I_{FSM} = 80$ A (pk), condition A 2, $I_O = 3$ 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.

4.4.3.1 Group C inspection, 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; t = 15 seconds. Lead fatigue: Test condition E; weight 1 pound.
C2	2038	US devices: Weight = 20 pounds; t = 15 seconds.
C5	4081	See 4.4.5 herein.
C6	1027	$I_F = 3$ A dc minimum, adjust I_F or T_A to achieve $T_J = +125^\circ\text{C}$ minimum.

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.

4.4.5 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 $R_{\theta JL}(\text{max}) = 30^\circ\text{C/W}$, $R_{\theta JEC}(\text{max}) = 10^\circ\text{C/W}$. The following conditions shall apply when using method 3101:

- a. I_M : 1mA to 10mA.
- b. I_H : 3A minimum.
- c. t_H : 25 seconds minimum.
- d. t_{MD} : 70 μs maximum.

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 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.

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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 examination	2071					
<u>Subgroup 2</u>						
Thermal impedance <u>2/</u>	3101	See 4.3.3	$Z_{\theta JX}$		2.5	$^{\circ}\text{C/W}$
Forward voltage 1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, $I_{FM} = 1.0$ A (pk) pulse method (see 4.5.1)	V_{FM1}		0.40 0.50	V V
1N5822, 1N5822US 1N6864, 1N6864US	4011	Condition B, $I_{FM} = 3.0$ A (pk) pulse method (see 4.5.1)	V_{FM2}		0.50 0.70	V V
1N5822, 1N5822US	4011	Condition B, $I_{FM} = 9.4$ A (pk) pulse method (see 4.5.1)	V_{FM3}		0.70	V
Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	$V_{RM} = 40$ V (pk) pulse method $V_{RM} = 80$ V (pk) pulse method (see 4.5.1)	I_{RM1}		0.10 0.15	mA mA
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +100^{\circ}\text{C}$				
Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	$V_{RM} = 40$ V (pk) pulse method $V_{RM} = 80$ V (pk) pulse method (see 4.5.1)	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 4.5.1)	V_{FM4}		0.47 0.65	V V
Low temperature operation:		$T_A = -55^{\circ}\text{C}$				
Reverse current leakage 1N5822, 1N5822US 1N6864, 1N6864US	4016	$V_{RM} = 40$ V (pk) pulse method $V_{RM} = 80$ V (pk) pulse method (see 4.5.1)	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 4.5.1)	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).
- Group B, subgroups 2 and 3 (JAN, JANTX, JANTXV).
- Group C, subgroups 2 and 6.
- Group E, subgroup 1.

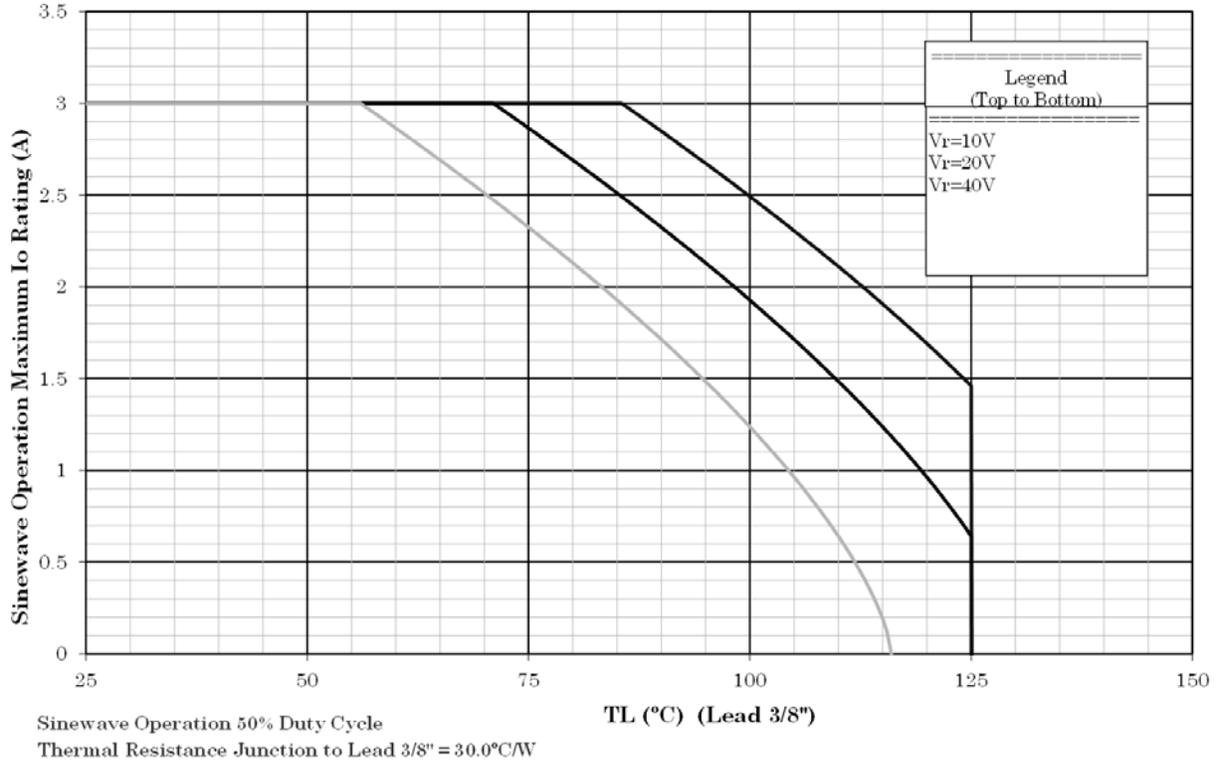
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TABLE II. Group E inspection (all quality levels) for qualification and requalification.

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>			
Intermittent Operating Life	1036	10,000 cycles	n = 22, c = 0
Electrical measurement		See table I , subgroup 2	
<u>Subgroup 4</u>			
Thermal impedance curves		See MIL-PRF-19500	
<u>Subgroup 5</u>			
Not applicable			
<u>Subgroup 6</u>			
ESD	1020		
<u>Subgroup 8</u>			n = 45
Resistance to glass cracking	1057	Test to destruction or 25 cycles max, whichever comes first.	

Temperature-Current Derating Curve

Family Curves TL=25°C 1N5822



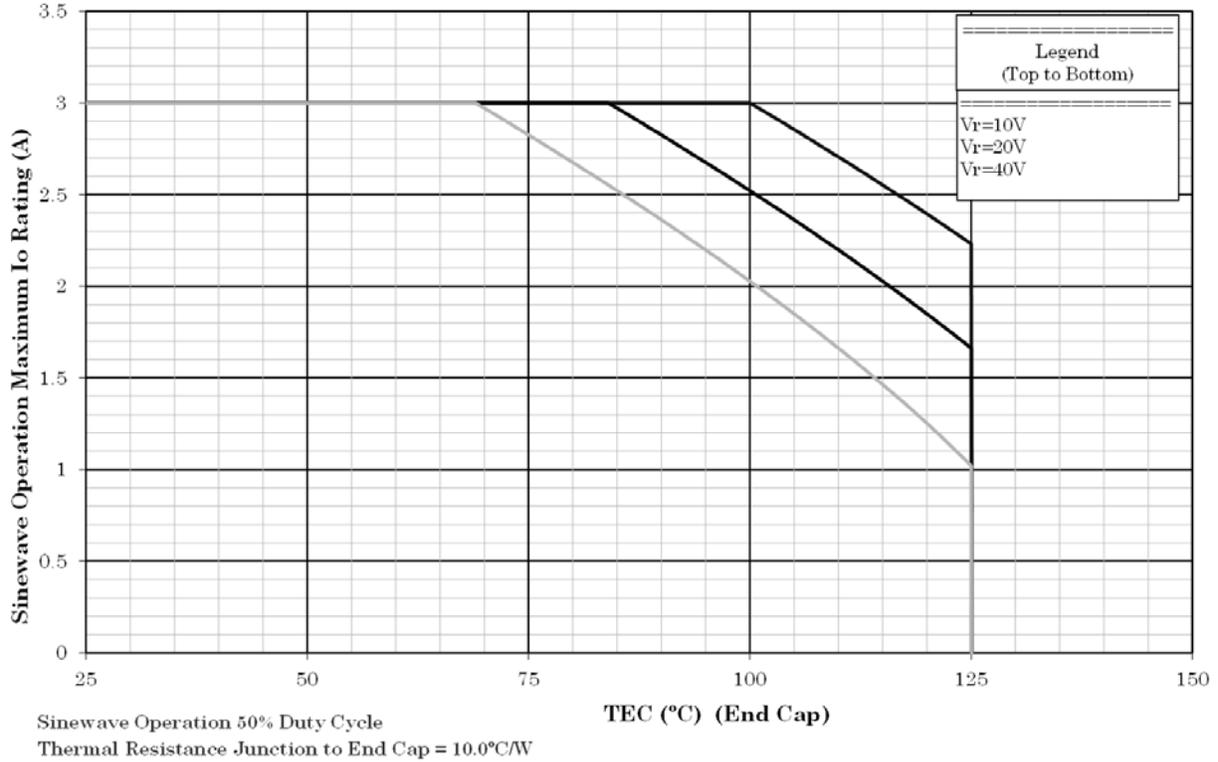
NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. This temperature-current derating curve varies with applied voltage.

* FIGURE 4. Temperature-current derating for 1N5822.

Temperature-Current Derating Curve

Family Curves TEC=25°C 1N5822US



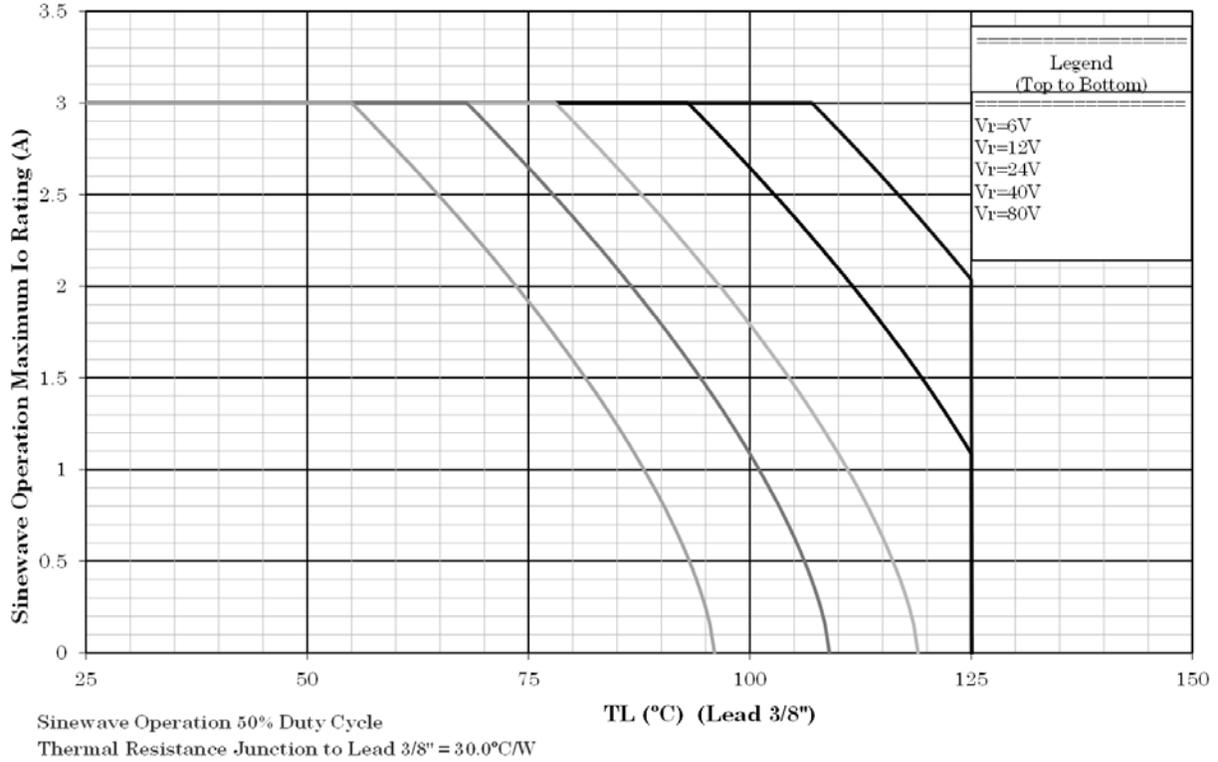
NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. This temperature-current derating curve varies with applied voltage.

* FIGURE 5. Temperature-current derating for 1N5822US.

Temperature-Current Derating Curve

Family Curves $T_L=25^\circ\text{C}$ 1N6864



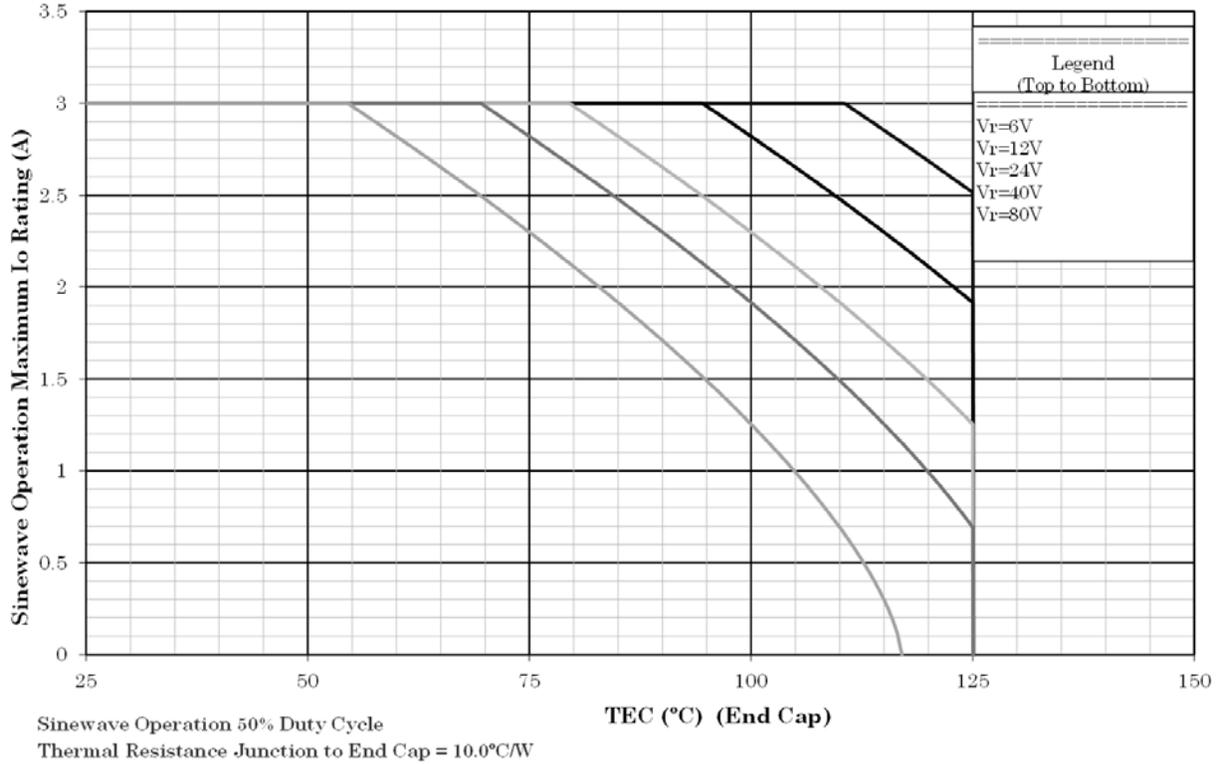
NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. This temperature-current derating curve varies with applied voltage.

* FIGURE 6. Temperature-current derating for 1N6864.

Temperature-Current Derating Curve

Family Curves TEC=25°C 1N6864US



NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating $\leq T_J$ specified on this curve. Any parallel line to this curve will intersect the appropriate power for the desired maximum T_J allowed.
2. This temperature-current derating curve varies with applied voltage.

* FIGURE 7. Temperature-current derating for 1N6864US.

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.

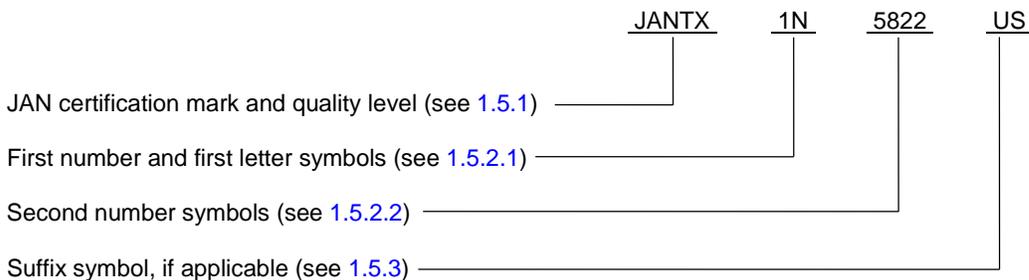
6.2 Acquisition requirements. The acquisition requirements should specify the following.

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

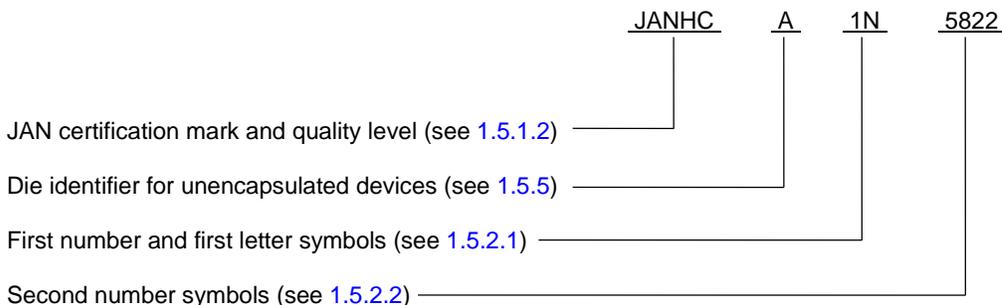
6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention 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.

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



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			
Axial Package	JAN1N5822	JANTX1N5822	JANTXV1N5822	JANS1N5822
	JAN1N6864	JANTX1N6864	JANTXV1N6864	JANS1N6864
US Package	JAN1N5822US	JANTX1N5822US	JANTXV1N5822US	JANS1N5822US
	JAN1N6864US	JANTX1N6864US	JANTXV1N6864US	JANS1N6864US

* 6.5.1 List of PINs for unencapsulated devices. The following is a list of possible PINs available on this specification sheet for unencapsulated 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
1N5822	JANHCA1N5822, JANKCA1N5822
1N6864	JANHCA1N6864, JANKCA1N6864

6.6 Applications data.

6.6.1 Square-wave application with 1N5822US. For a printed board mounting example with FR4 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 55°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 FR4 base material to support operation at 2 A I_O 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 [figure 8](#) and [figure 9](#) 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 10](#) 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) $.026 \text{ inch}^2$ (16.77 mm^2) for 1 ounce copper foil.
 - 2) $.16 \text{ inch}^2$ (103.23 mm^2) for 2 ounce copper foil.
 - 3) $.1 \text{ inch}^2$ (64.52 mm^2) 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

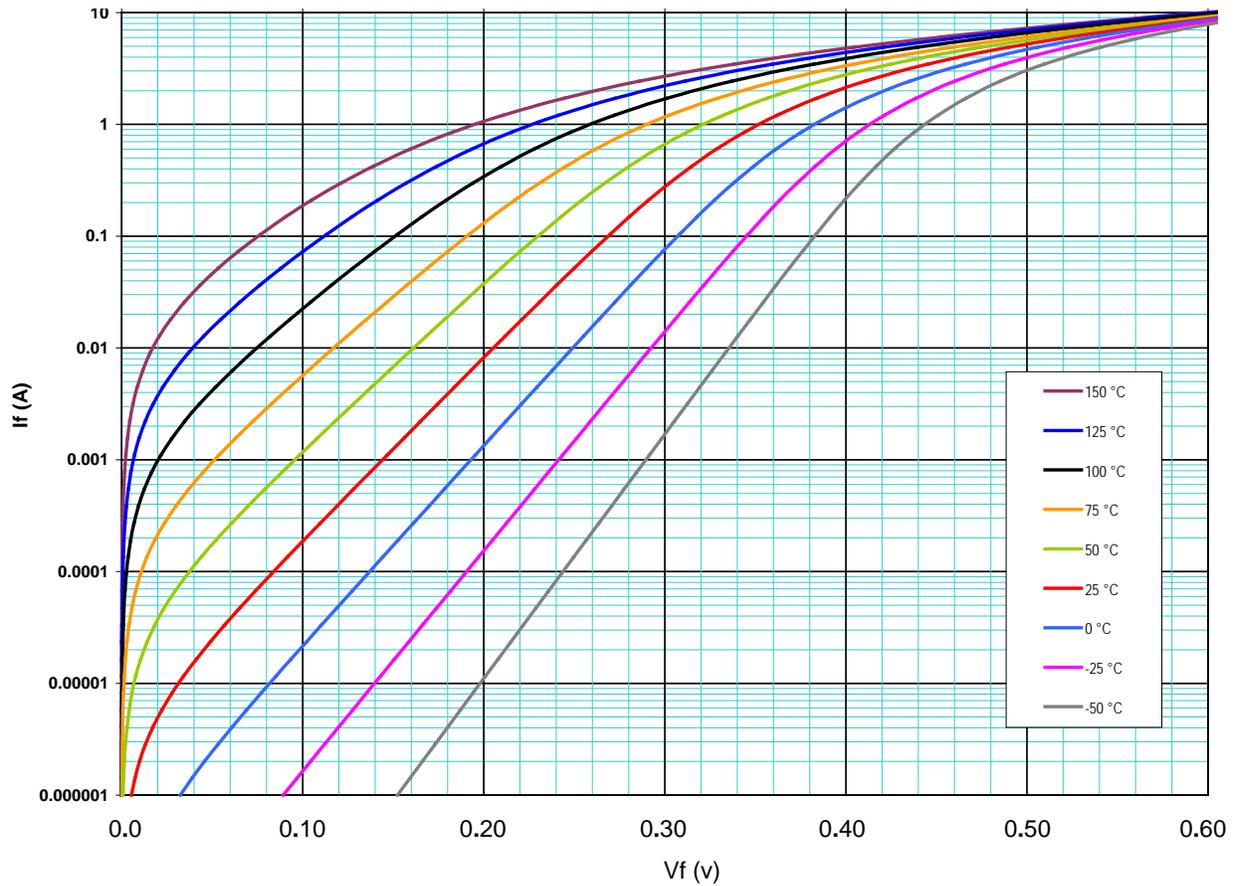


FIGURE 8. V_F versus I_F Curve.

Schottky $V_f - I_f$ Characteristics 1N6864

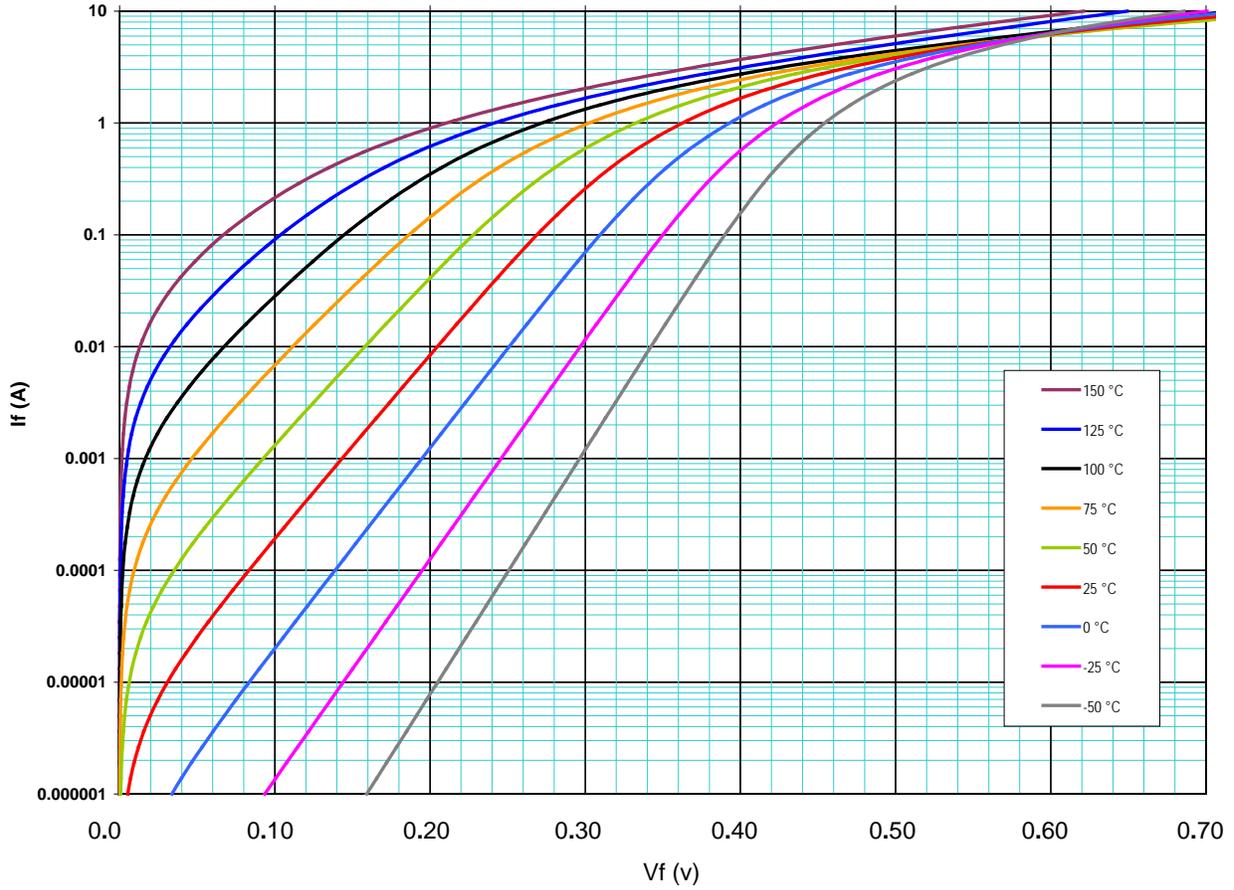


FIGURE 9. V_F versus I_F Curve.

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

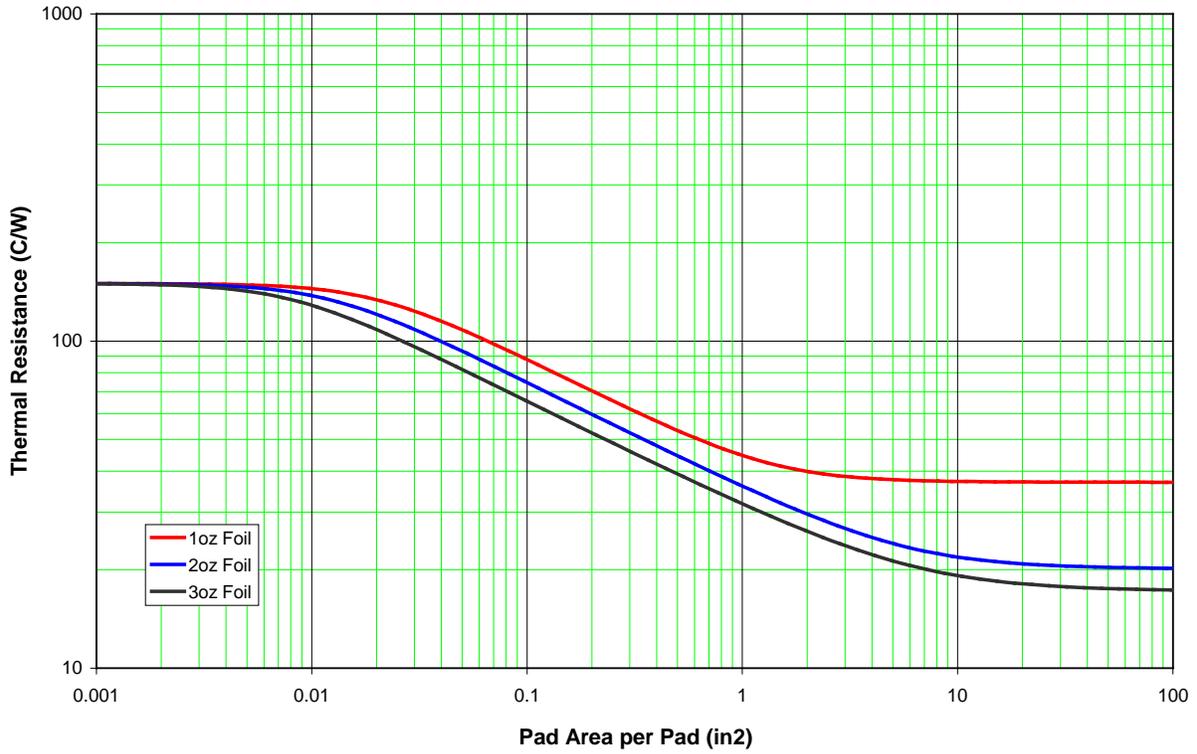


FIGURE 10. Thermal resistance calculator (Junction to Ambient on PCB).

* 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 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. 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
NASA - NA
DLA - CC

Preparing activity:

DLA - CC

(Project 5961-2016-058)

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>.