The documentation and process conversion measures necessary to comply with this revision shall be completed by 28 May 2014.

INCH-POUND

MIL-PRF-19500/620J
28 February 2014
SUPERSEDING
MIL-PRF-19500/620H
25 August 2011

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, HERMETIC, DIODE, SILICON, RECTIFIER, SCHOTTKY BARRIER, TYPES 1N5822, 1N5822US, 1N6864, 1N6864US, 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 are provided for each device type as specified in MIL-PRF-19500, and two levels of product assurance for die (element evaluation).

1.2 Physical dimensions. See figures 1 (axial), 2 (US surface mount), and 3 (die) dimensions.

* 1.3 Maximum ratings. Unless otherwise specified, T_A = +25°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)
	V(pk)	A dc	A(pk)	°C/W	°C/W	°C/W	°C	°C
1N5822, 1N5822US	40	3.0	80	2.5	30	10	-65 to +150	-65 to +125
1N6864, 1N6864US	80	3.0	80	2.5	30	10		

(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. T_A = +75°C for both axial and Metal Electrode Leadless Face diodes (MELF) (US) on printed circuit board (PCB), PCB = FR4 - .0625 inch (1.59 mm) 1-layer 1-Oz Cu, horizontal, in still air, pads for (US) = .061 inch (1.55 mm) x .105 inch (2.67 mm); pads for axial = .092 inch (2.34 mm) diameter, strip = .030 inch (0.76 mm) x 1 inch (25.4 mm) long, lead length L ≤ .187 inch (≤ 4.75 mm); $R_{\Theta JA}$ with a defined PCB thermal resistance condition included, is measured at I_O = 1A.

(2) T_A = 55°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.

1.4 Primary electrical characteristics. Unless otherwise specified, T_A = +25°C.

Types	V_{FM1} I_{FM} = 1.0 A	V_{FM2} I_{FM} = 3.0 A	V_{FM3} I_{FM} = 9.4 A	I_{RM} V_{RM} = 40 V dc (1N5822) V_{RM} = 80 V dc (1N6864) pulsed method (see 4.5.1)		$R_{\theta JL}$ .375 inch (9.52 mm) Lead length	$R_{\theta JEC}$
				T_J = +25°C I_{RM1}	T_J = +100°C I_{RM2}		
	V (pk)	V (pk)	V (pk)	mA	mA	°C/W	°C/W
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

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3 or 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 or 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

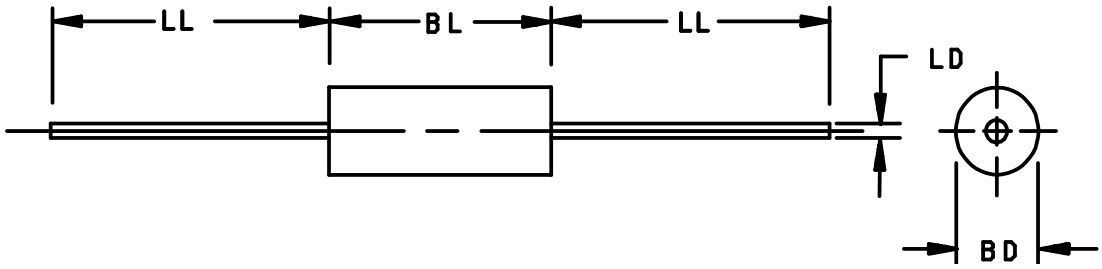
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

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

* (Copies of these documents are available online at http://quicksearch.dla.mil.)

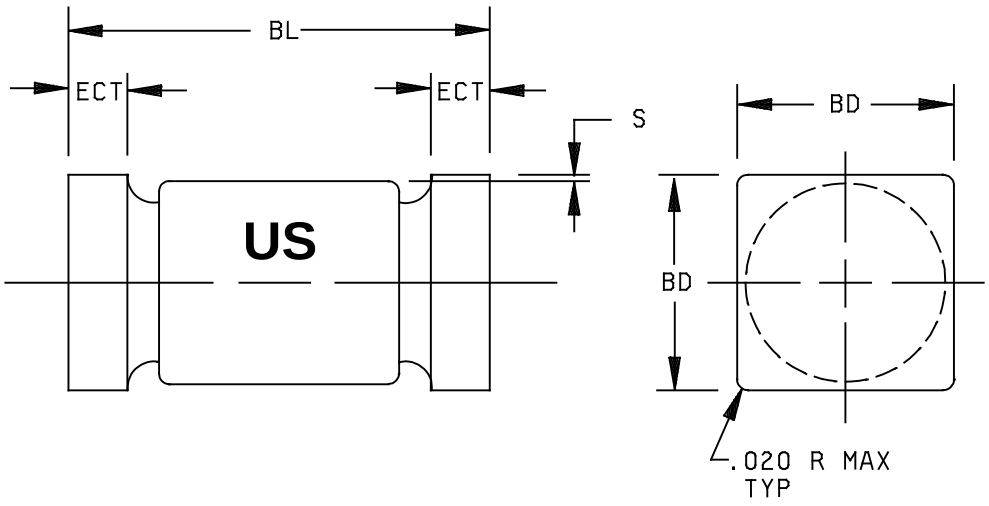
2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific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



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 Φx symbology.

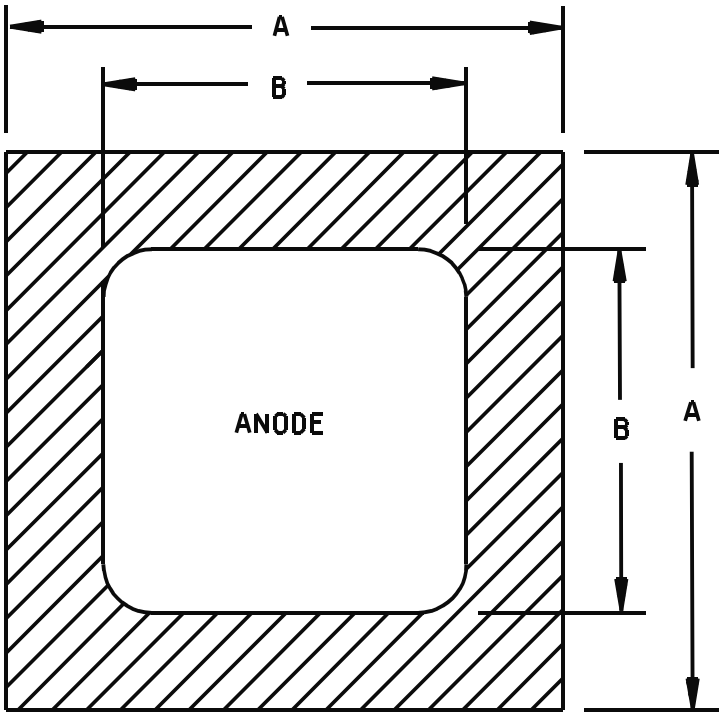
FIGURE 1. Physical dimensions of 1N5822 and 1N6864.



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 Φx 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 (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 (see table E-IV of MIL-PRF-19500)	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°C; V_{RWM} = 40 V(pk); 1N6864, T_A = +80°C; V_{RWM} = 80 V(pk); V_{RWM} = half sine wave, f = 60Hz	Required 1N5822, T_A = +90°C; V_{RWM} = 40 V(pk); 1N6864, T_A = +80°C; V_{RWM} = 80 V(pk); V_{RWM} = half sine wave, f = 60Hz
11	Required $\Delta I_{R1} \leq$ 100 percent of initial reading or 0.05 mA whichever is greater; $\Delta V_{FM2} \leq \pm$50 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 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 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 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.

4.3.1.1 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.

4.4 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 μs 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. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.2.1 Group B inspection, table E-VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Condition
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°C minimum.

4.4.2.2 Group B inspection, table E-VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
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°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. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.3.1 Group C inspection, table E-VII of MIL-PRF-19500.

	Subgroup	Method	Condition
*	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°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. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 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 $R_{\theta JL}$ (max) = 30°C/W, $R_{\theta JEC}$ (max) = 10°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.

TABLE I. Group A inspection.

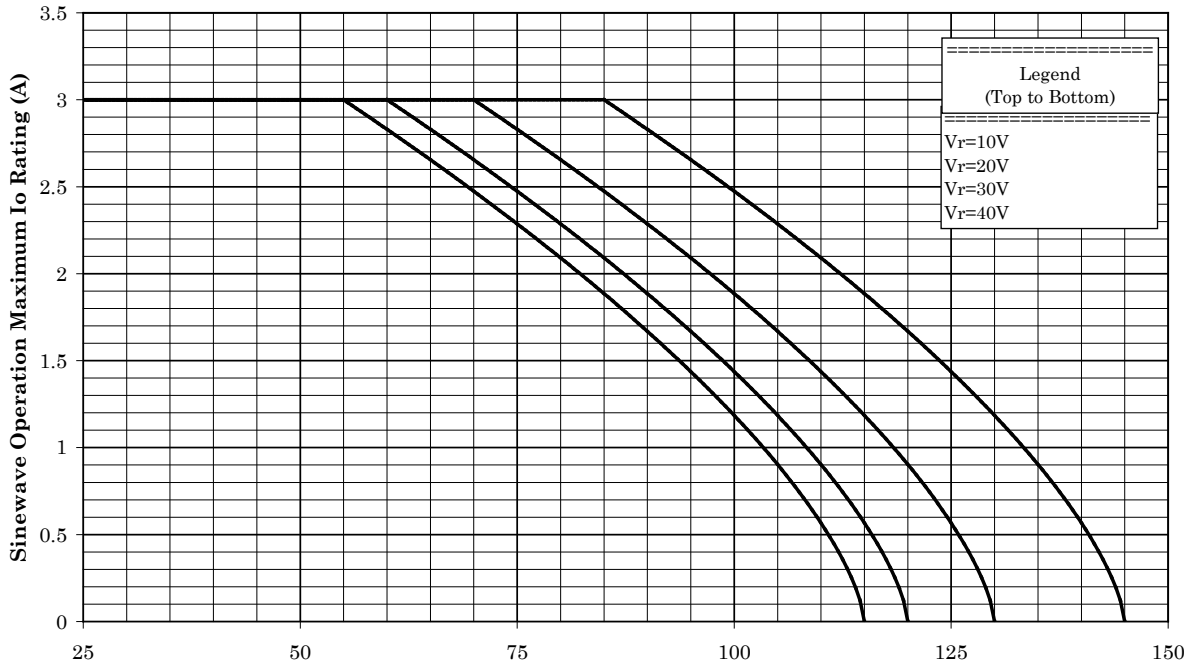
Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Thermal impedance	3101	See 4.3.3	$Z_{\theta JX}$		2.5	°C/W
Forward voltage	4011	I_{FM} = 1.0 A (pk) pulse method (see 4.5.1)	V_{FM1}			
1N5822, 1N5822US					0.40	V
1N6864, 1N6864US					0.50	V
1N5822, 1N5822US	4011	I_{FM} = 3.0 A (pk) pulse method (see 4.5.1)	V_{FM2}		0.50	V
1N6864, 1N6864US					0.70	V
1N5822, 1N5822US	4011	I_{FM} = 9.4 A (pk) pulse method (see 4.5.1)	V_{FM3}		0.70	V
Reverse current leakage	4016		I_{RM1}			
1N5822, 1N5822US		V_{RM} = 40 V (pk) pulse method			0.10	mA
1N6864, 1N6864US		V_{RM} = 80 V (pk) pulse method (see 4.5.1)			0.15	mA
Subgroup 3						
High temperature operation:		T_A = +100°C				
Reverse current leakage	4016		I_{RM2}			
1N5822, 1N5822US		V_{RM} = 40 V (pk) pulse method			12.5	mA
1N6864, 1N6864US		V_{RM} = 80 V (pk) pulse method (see 4.5.1)			18.0	mA
Forward voltage	4011	I_F = 3.0 A (pk) pulse method (see 4.5.1)	V_{FM4}			
1N5822, 1N5822US					0.47	V
1N6864, 1N6864US					0.65	V
Low temperature operation:		T_A = -55°C				
Reverse current leakage	4016		I_{RM3}			
1N5822, 1N5822US		V_{RM} = 40 V (pk) pulse method			0.40	mA
1N6864, 1N6864US		V_{RM} = 80 V (pk) pulse method (see 4.5.1)			0.55	mA
Forward voltage	4011	I_F = 3.0 A (pk) pulse method (see 4.5.1)	V_{FM5}			
1N5822, 1N5822US					0.62	V
1N6864, 1N6864US					0.80	V
Subgroup 4, 5, 6, and 7						
Not applicable						

1/ For sampling plan, see MIL-PRF-19500.

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

	Inspection	MIL-STD-750		Sampling plan
		Method	Conditions	
*	Subgroup 1			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	
	Subgroup 2			
	Intermittent Operating Life	1036	10,000 cycles	n = 22, c = 0
	Electrical measurement		See table I, subgroup 2	
	Subgroup 4			
	Thermal impedance curves		See MIL-PRF-19500	
	Subgroup 5			
	Not applicable			
*	Subgroup 6			
	ESD	1020		
	Subgroup 8			n = 45
	Resistance to glass cracking	1057	Test to destruction or 25 cycles max, whichever comes first.	

TEMPERATURE-CURRENT DERATING CURVE
1N5822 AXIAL LEAD-MOUNTED

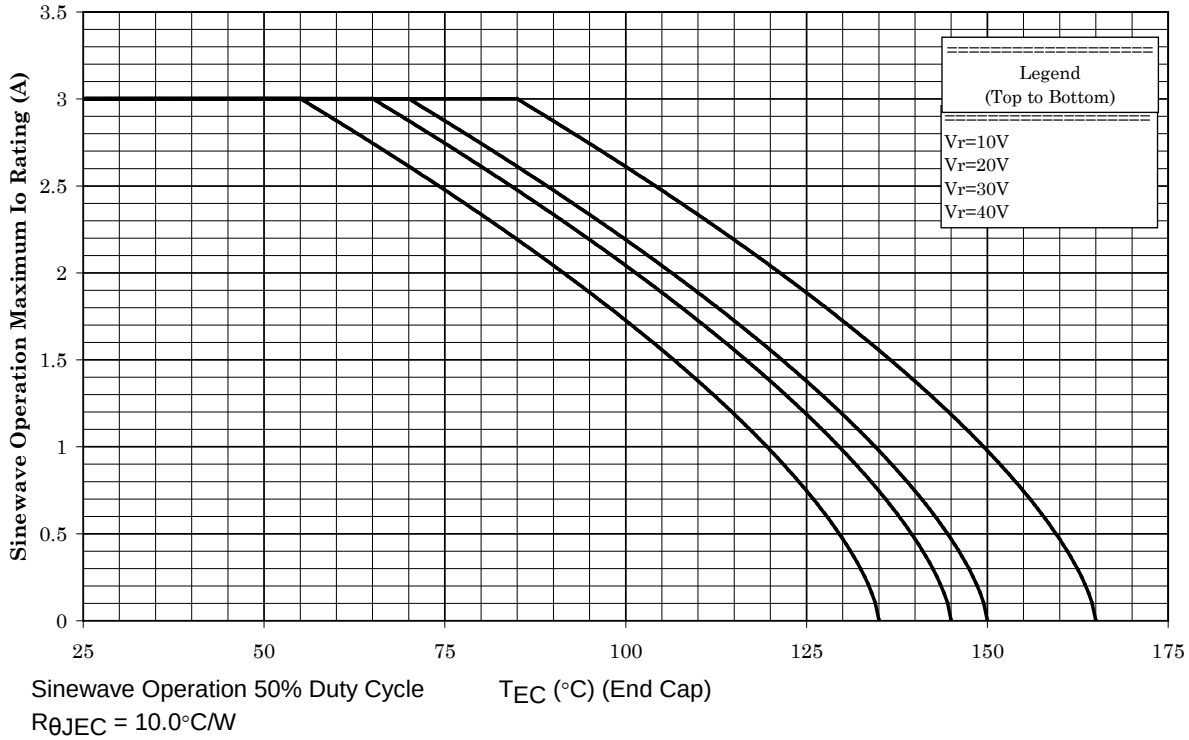


Sinewave Operation 50% Duty Cycle T_L (°C) (Lead = 3/8")
$R_{\theta JL}$ = 30.0°C/W

NOTES:
1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating ≤ 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
1N5822US END-CAP MOUNTED

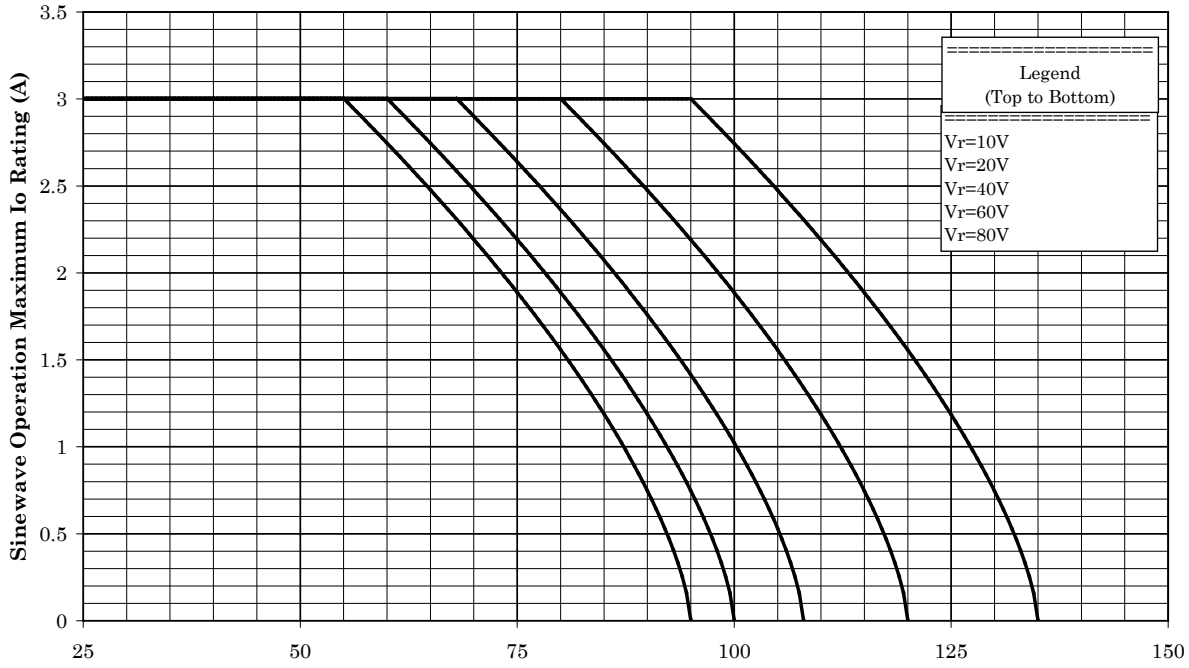


NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating ≤ 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
1N6864 AXIAL LEAD-MOUNTED



Sinewave Operation 50% Duty Cycle T_L (°C) (Lead = 3/8")

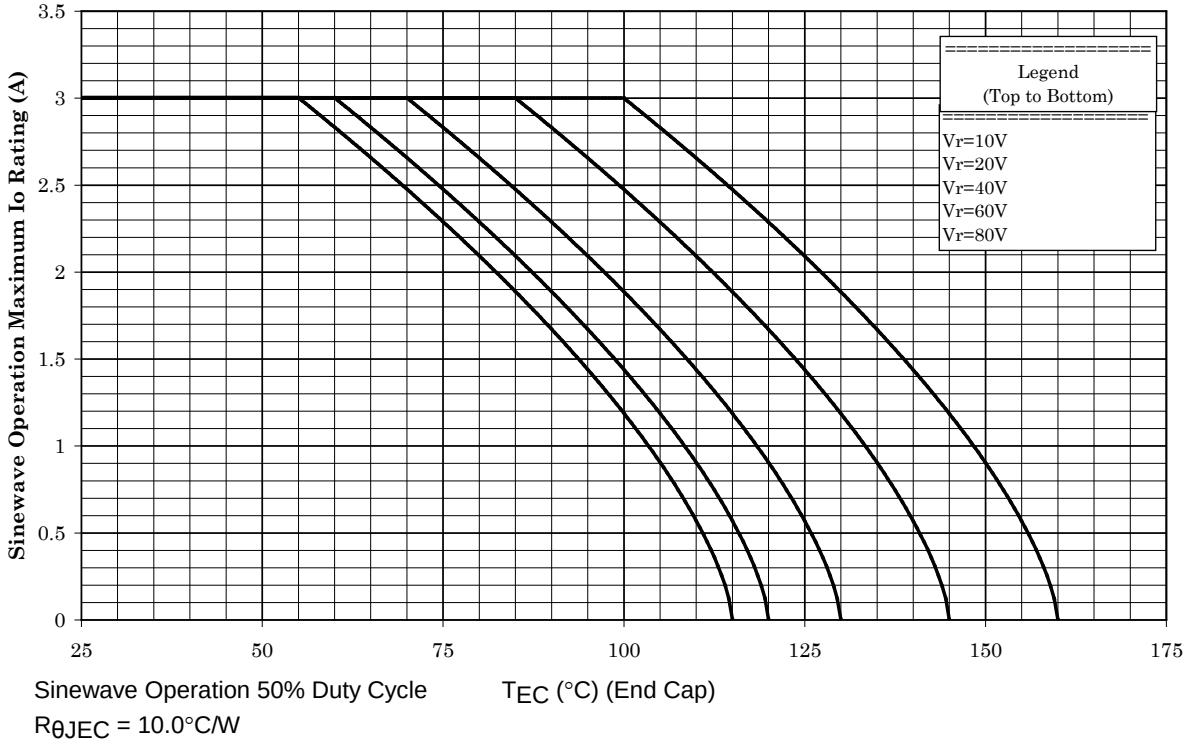
$R_{\theta JL}$ = 30.0°C/W

NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating ≤ 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
1N6864US END-CAP MOUNTED



NOTES:

1. This is the true inverse of the worst case thermal resistance value. All devices are capable of operating ≤ 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 1.2.

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 Suppliers of die. The qualified die suppliers with the applicable letter version (e.g., JANHCA1N5822) will be identified on the QML.

JANC ordering information	
PIN	Manufacturer
	43611
1N5822	JANHCA1N5822 JANKCA1N5822
1N6864	JANHCA1N6864 JANKCA1N6864

6.5 Applications data.

6.5.1 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 = 100ºC and ambient temperature of 55ºC, 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 = 100ºC with T_A = 50ºC.

b. Calculate peak I_F = 2 A / 0.50 duty factor = 4 A.

c. Use the V_F versus I_F curve on figure 8 and figure 9 to look up I_F = 4 A (Y-axis) and follow across to the T_J = 100ºC curve (middle) for V_F = 0.39 V.

d. Calculate power = I_F * V_F * duty factor = 4 * 0.39 * 0.50 = 0.78 W.

e. Calculate maximum thermal resistance needed (100ºC – 50ºC) / 0.78 W = 64ºC/W.

f. Locate the thermal resistance of 64ºC/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 inch^2 (167.4 mm^2) for 1 ounce copper foil.
   2) .16 inch^2 (103.23 mm^2) for 2 ounce copper foil.
   3) .1 inch^2 (64.52 mm^2) for 3 ounce copper foil.

h. A conservative pad guard-band is optional since $T_J \geq 125$ºC. Multilayer printed boards or forced air cooling will improve performance. Closed confinement of the printed board will do the opposite.

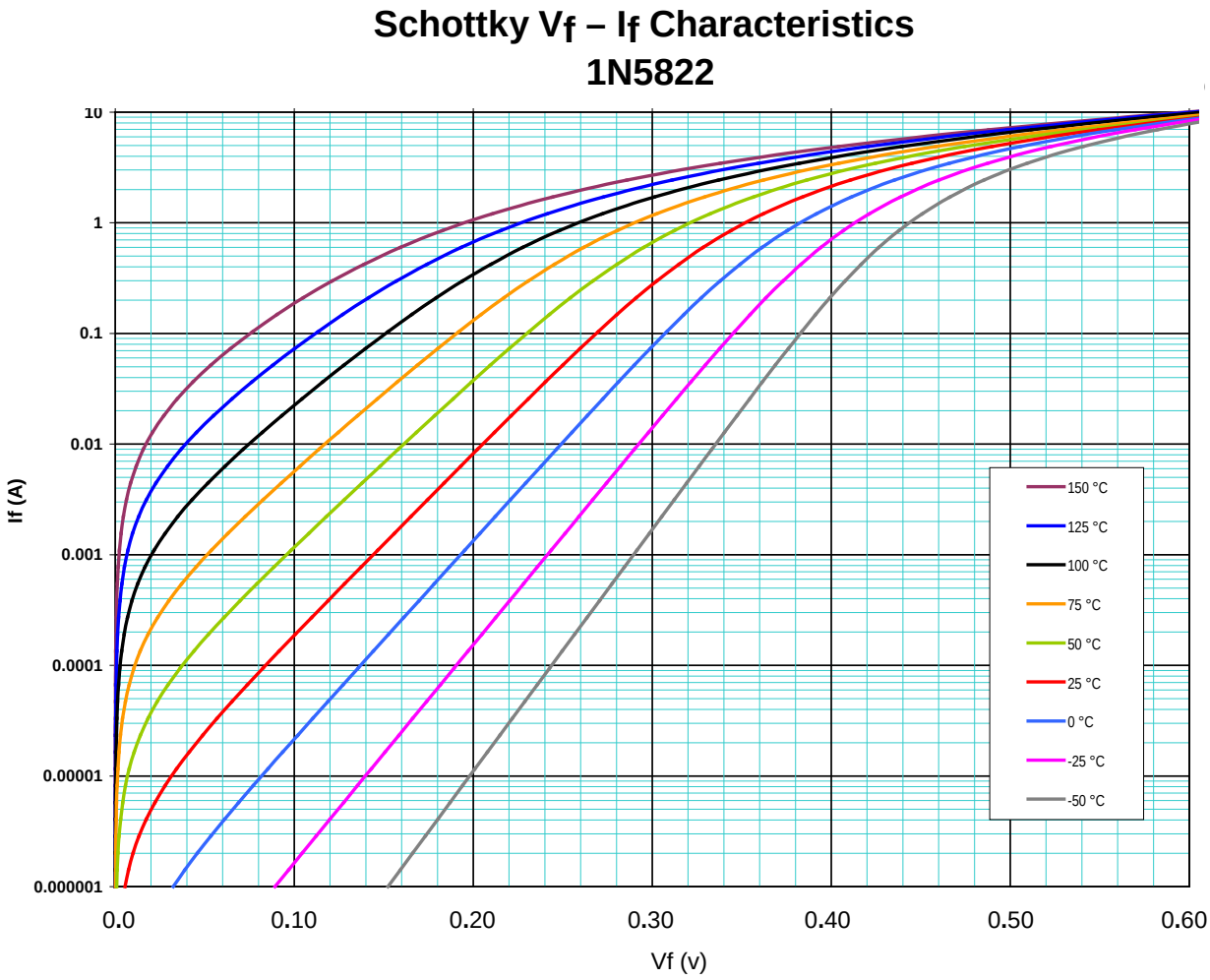


FIGURE 8. Power handling application notes (V_f-I_f).

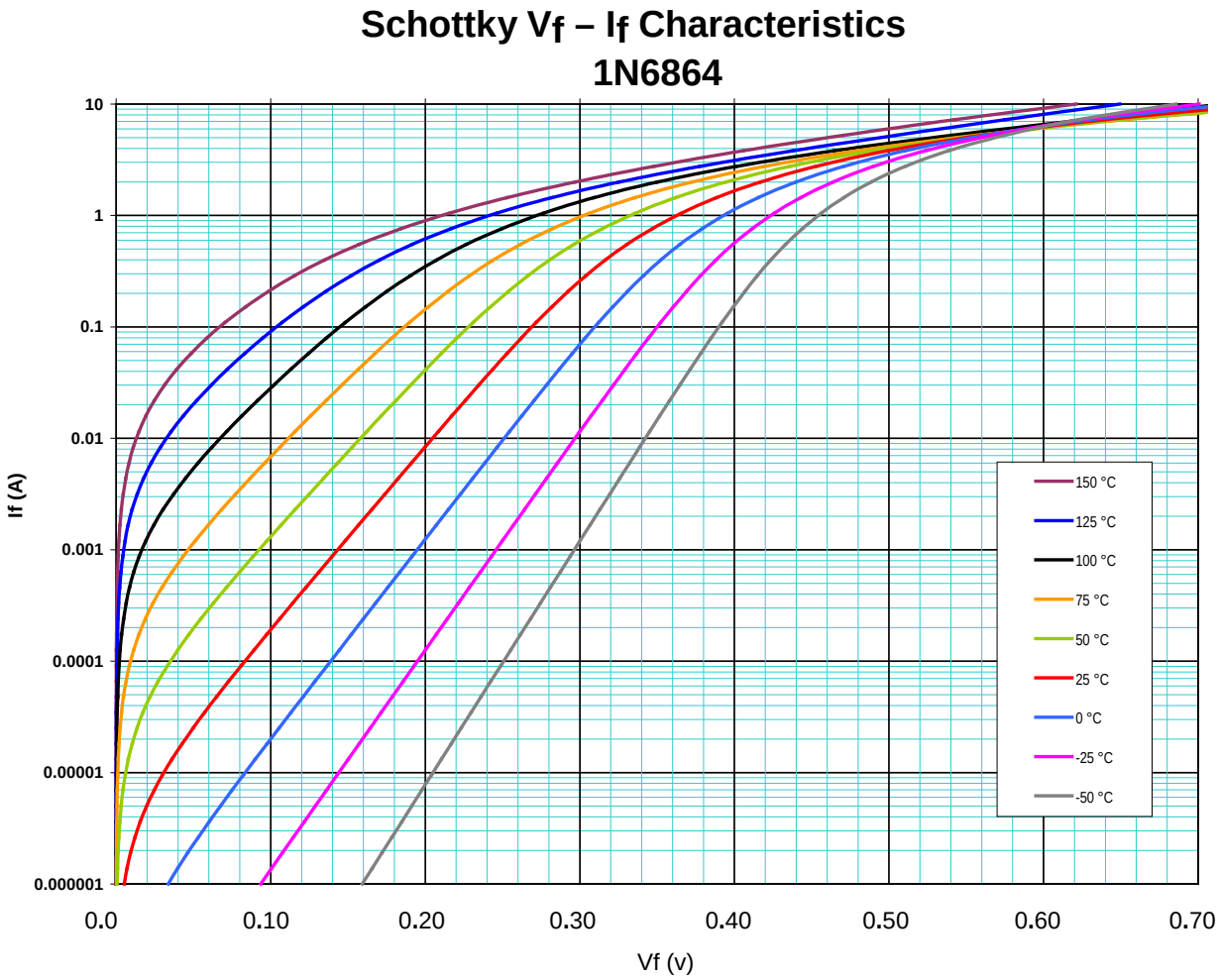


FIGURE 9. Power handling application notes (V_f-I_f).

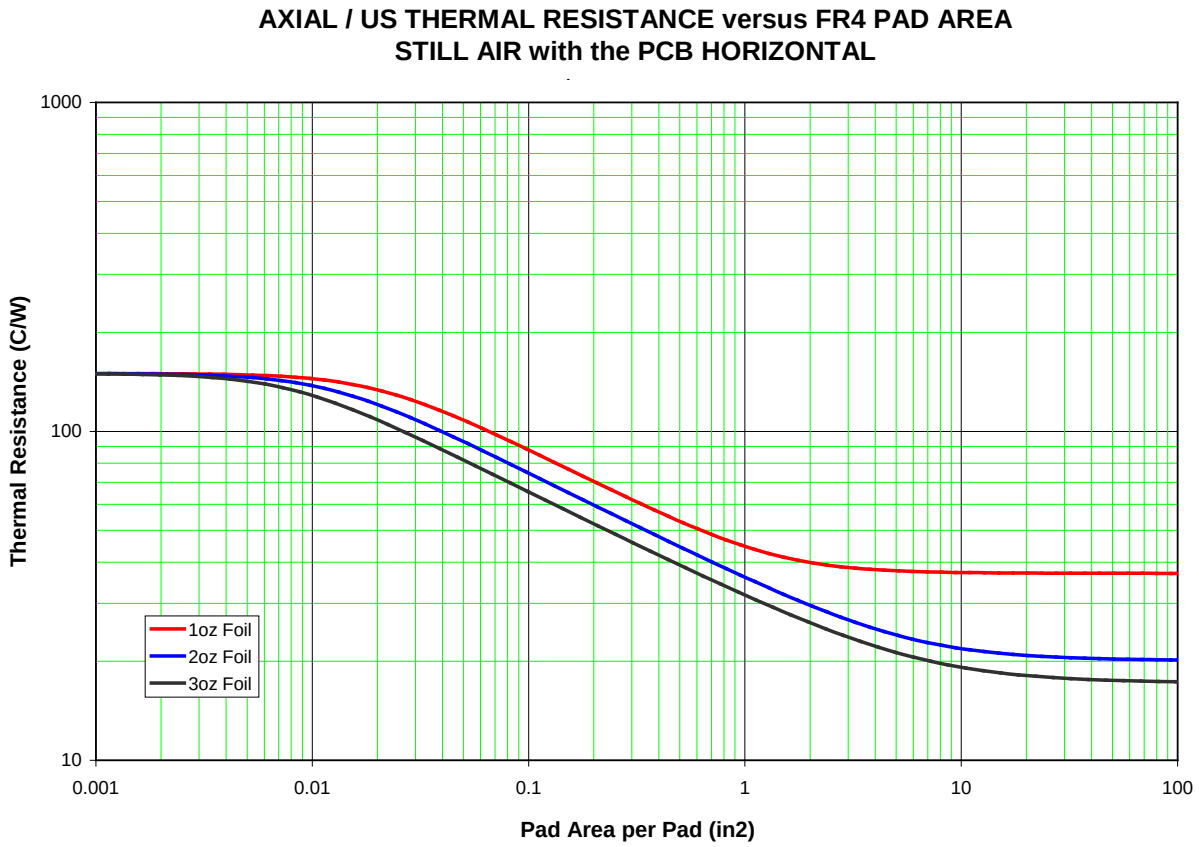


FIGURE 10. Thermal resistance calculator.

6.6 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

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

Preparing activity:
DLA - CC

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