The documentation and process conversion measures necessary to comply with this revision shall be completed by 24 August 2005.

INCH-POUND
MIL-PRF-19500/578F
24 August 2005
SUPERSEDING
MIL-PRF-19500/578E
21 June 2001

* PERFORMANCE SPECIFICATION SHEET

* SEMICONDUCTOR DEVICE, DIODE, SILICON, SWITCHING, 1N6638, 1N6642, 1N6643, 1N6638U, 1N6642U, 1N6643U, 1N6638US, 1N6642US, 1N6643US, 1N6642UB, 1N6642UB2, 1N6642UB2R, 1N6642UBCA, 1N6642UBD, 1N6642UBCC, JAN, JANTX, JANTXV, AND JANS

* The JANS1N4148-1 is not qualified and is superseded by JANS1N6642. See 6.4.

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 switching diodes. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figures 1 (similar to DO-35), 2 (US), 3 (UB), and 4 (UB2).

* 1.3 Maximum ratings. T_A = +25°C.

Types	V_{BR}	V_{RWM}	$I_{O(PCB)}$ (1) T_A=75°C	I_{FSM} t_p = 1/120 s	T_{STG} & T_J	$R_{\Theta JL}$ L = .375 inch (9.53 mm)	$R_{\Theta JEC}$ L = 0	$R_{\Theta JA}$ (1)	$R_{\Theta JSP}$
	V (pk)	V (pk)	mA	A (pk)	°C	°C/W	°C/W	°C/W	°C/W
1N6638	150	125	300	2.5	-65 to +175	150		250	
1N6638U, 1N6638US	150	125	300	2.5	-65 to +175		40	250	
1N6642	100	75	300	2.5	-65 to +175	150		250	
1N6642U, 1N6642US	100	75	300	2.5	-65 to +175		40	250	
1N6642UB, 1N6642UB2, 1N6642UB2R, 1N6642UBD, 1N6642UBCC, 1N6642UBCA	100	75	300	2.5	-65 to +200			250	120
1N6643	75	50	300	2.5	-65 to +175	150		250	
1N6643U, 1N6643US	75	50	300	2.5	-65 to +175		40	250	

(1) See figure 3 for temperature-current derating curve. T_A = +75°C for both axial and 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 = 0.030 inch (0.76 mm) x 1 inch (25.4 mm) long, lead length L ≤ 0.187 inch (≤ 4.75 mm); $R_{\Theta JA}$ with a defined PCB thermal resistance condition included, is measured at I_O = 300mA.

* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to semiconductor@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

AMSC N/A FSC 5961

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

Types (1)	V_{FI} I_F = 10 mA	V_{F2}	I_{R1} V_R = 20 V	I_{R2} V_R = V_{RWM}	I_{R3} V_R = 20 V T_A = +150°C	I_{R4} V_R = V_{RWM} T_A = +150°C	t_{fr} I_F = 50 mA	t_{rr} I_{RM} = I_F = 10 mA	C_{T1} V_R = 0
	V dc	V dc	nA dc	µA dc	µA dc	µA dc	ns	ns	pF
1N6638, 1N6638U 1N6638US	0.8	(2) 1.1	35	0.4	50	100	20	4.5	2.5
1N6642, 1N6642U, 1N6642US, 1N6642UB, 1N6642UB2, 1N6642UB2R, 1N6642UBD, 1N6642UBCC, 1N6642UBCA	0.8	(3) 1.2	25	0.4	50	100	20	5.0	5.0
1N6643, 1N6643U, 1N6643US	0.8	(3) 1.2	50	0.4	75	100	20	6.0	5.0

(1) Suffix "U" devices are structurally identical to the suffix "US" devices.
(2) I_F = 200 mA.
(3) I_F = 100 mA.

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 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

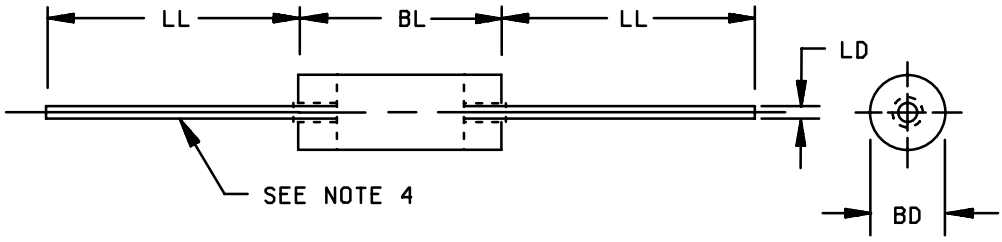
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

* DEPARTMENT OF DEFENSE STANDARDS

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

* (Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. 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.

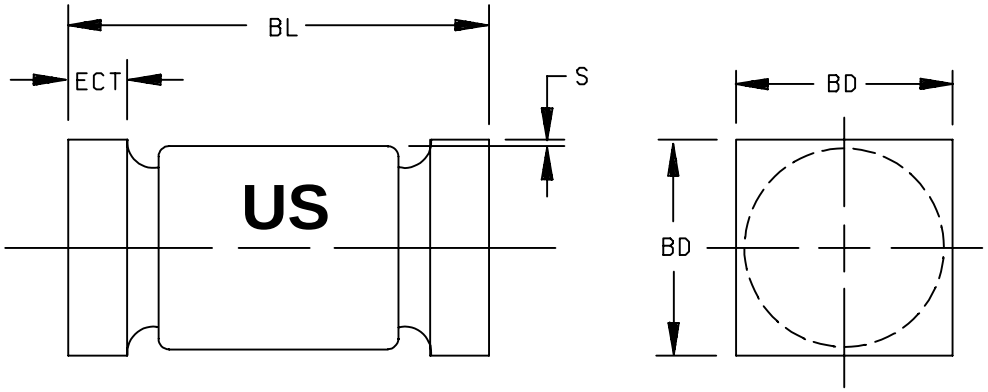


Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.056	.080	1.42	2.03	3, 4
BL	.130	.180	3.30	4.57	4
LD	.018	.022	0.46	0.56	5
LL	1.00	1.50	25.40	38.10	

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. The minimum dimension of BD shall apply over at least .065 inch (1.65 mm) of dimension BL.
5. The specified lead diameter applies in the zone between .050 inch (1.27 mm) from the diode body to the end of the lead. Outside of this zone lead shall not exceed BD.
6. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology

Types 1N6638, 1N6642, and 1N6643.

FIGURE 1. Physical dimensions (similar to DO-35).

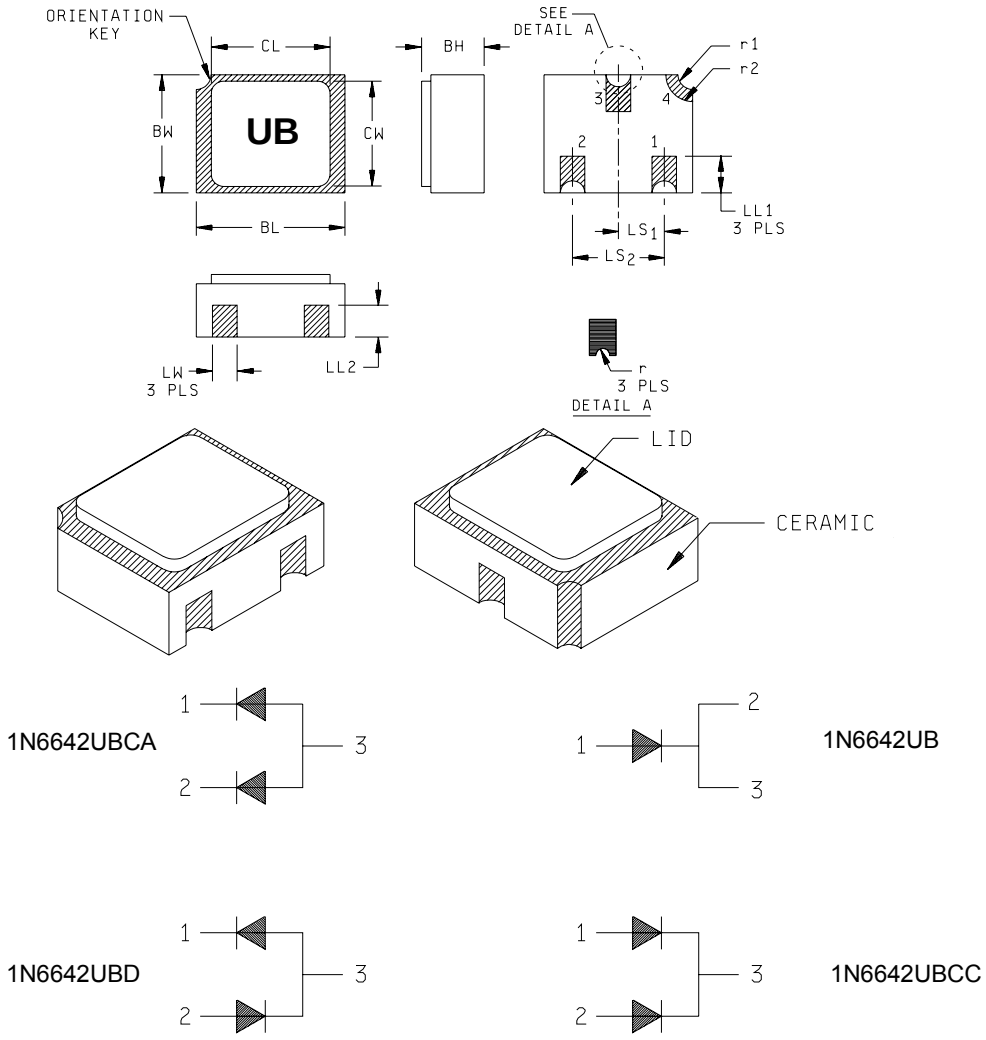


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BD	.070	.085	1.78	2.16
BL	.165	.195	4.19	4.95
ECT	.019	.028	0.48	0.71
S	.003		0.08	

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology

TYPES 1N6638U, 1N6642U, AND 1N6643U, 1N6638US, 1N6642US, AND 1N6643US

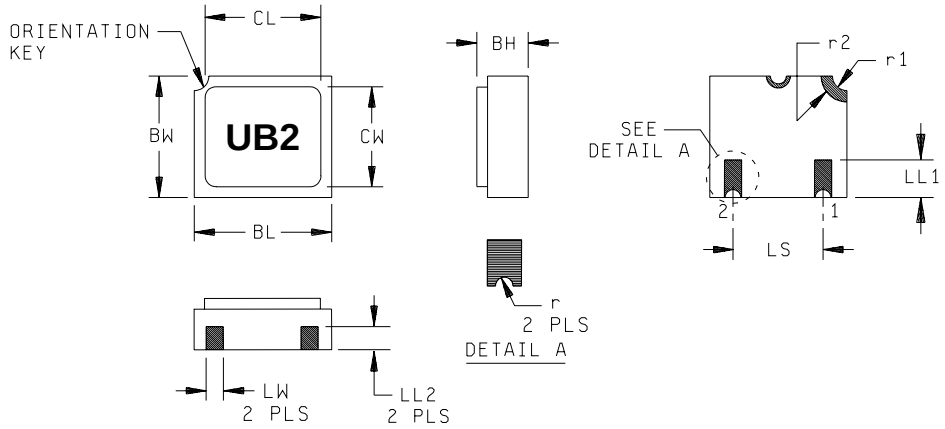
FIGURE 2. Physical dimensions of surface mount family (DO-213AA).



Symbol	Dimensions				Symbol	Dimensions			
	Inches		Millimeters			Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
BH	.046	.056	0.97	1.42	LS1	.035	.040	0.89	1.02
BL	.115	.128	2.82	3.25	LS2	.071	.079	1.81	2.01
BW	.085	.108	2.41	2.74	LW	.016	.024	0.41	0.61
CL		.128		3.25	r		.008		0.20
CW		.108		2.74	r1		.012		0.31
LL1	.022	.038	0.56	0.96	r2		.022		0.56
LL2	.017	.035	0.43	0.89					

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Ceramic package only.

* FIGURE 3. Physical dimensions, surface mount (UB version).



Symbol	Dimensions				Symbol	Dimensions			
	Inches		Millimeters			Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
BH	.046	.056	0.97	1.42	LL2	.017	.035	0.43	0.89
BL	.115	.128	2.82	3.25	LS	.071	.079	1.81	2.01
BW	.085	.108	2.41	2.74	LW	.016	.024	0.41	0.61
CL		.128		3.25	r		.008		0.20
CW		.108		2.74	r1		.012		0.31
LL1	.022	.038	0.56	0.96	r2		.022		0.56

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Ceramic package only.

FIGURE 4. Physical dimensions, surface mount (2 pin UB version)(1N6642UB2, 1N6642UB2R).

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 manufacturers list 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 and as follows.

$R_{\Theta JBB}$ Thermal resistance junction to burn-in board.

* 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1, figure 2, figure 3 (UB), and figure 4 (UB2).

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 constructed in a manner and using materials which enable the diodes to meet the applicable requirements of MIL-PRF-19500 and this document.

a. All devices shall be of metallurgically bonded, thermally matched, non-cavity, double-plug construction in accordance with the requirements of category I (see MIL-PRF-19500). The ‘UB’ devices shall be eutectically mounted and wire bonded in a ceramic package.

b. The 'US' version shall be structurally identical to the ‘U’ and non-‘US’ versions except for end-cap lead attachment.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I.

3.6 Electrical test requirements. The electrical test requirements shall be as specified in table I herein.

* 3.7 Marking. Marking shall be in accordance with MIL-PRF-19500. Manufacturer’s identification and date code shall be marked on the devices. Initial container package marking shall be in accordance with MIL-PRF-19500. The polarity shall be indicated with a contrasting color band to denote the cathode end. The prefixes JAN, JANTX, JANTXV, and JANS can be abbreviated as J, JX, JV, and JS respectively. The part number may be reduced to J6638, JX6638, JV6638, or JS6638. No color coding will be permitted for part numbering.

* 3.7.1 US devices. For ‘US’ version devices only, all marking, except polarity (and serial number for JANS) may be omitted from the body, but shall be retained on the initial container. ‘US’ devices shall be marked with a cathode band as a minimum. For ‘US’ devices, a minimum of three evenly spaced contrasting color dots around the periphery of the cathode end may be used.

* 3.7.2 UB devices. ‘UB’ package does not require polarity marking.

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).

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

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

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

Screen (see table IV of MIL-PRF-19500)	JANS level	JANTXV and JANTX level
1a 1b	Required Required	Not required Required (JANTXV only)
2	Not required	Not required
3a 3b (1) 3c	Required Not applicable Thermal impedance (see 4.3.2)	Required Not applicable Thermal impedance (see 4.3.2)
4	Not applicable	Not applicable
5	Not applicable	Not applicable
6	Not applicable	Not applicable
7a 7b	Not applicable (required for UB) Optional	Not applicable (required for UB) Optional
8	Optional	Not required
9	I_{R1}	Not applicable
10	Method 1038 of MIL-STD-750, condition A	Method 1038 of MIL-STD-750, condition A
11	V_{F2}, I_{R1}; and V_{BR}; ΔI_{R1} ±15 nA dc or 100 percent of initial value whichever is greater.	V_{F2} and I_{R1}
12	Required, see 4.3.1	Required, see 4.3.1
13	Subgroups 2 and 3 of table I herein; $\Delta I_{R1} \leq$ 100 percent of initial reading or 15 nA dc, whichever is greater. $\Delta V_{F2} \leq \pm$ 0.030 V dc (scope display, see 4.5.3).	Subgroup 2 of table I herein; $\Delta I_{R1} \leq$ 100 percent of initial reading or 15 nA dc, whichever is greater. $\Delta V_{F2} \leq \pm$ 0.030 V dc (scope display, see 4.5.3).
14a (2) 14b	Not applicable (required for UB) Required	Not applicable (required for UB) Required
15	Required	Not required
16	Required	Not required

(1) Thermal impedance shall be performed any time after screen 3.
(2) For clear glass diodes, the hermetic seal (gross leak) test may be performed any time after temperature cycling.

* 4.3.1 Power burn-in conditions. Power burn-in conditions are as follows (See 4.5.3): Method 1038 of MIL-STD-750, condition B. V_R = rated V_{RWM}; f = 50-60 Hz; I_O = 200 mA dc or I_F = 200 mA dc minimum. T_A = 75°C maximum. Adjust I_O or IF to achieve T_J = 135°C minimum or to the maximum current density limited by small die geometry. The maximum current density of small die shall be submitted to the qualifying activity for approval. Alternate mounting conditions shall be submitted to the qualifying activity for approval. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, T_J, and mounting conditions) may be used. A justification demonstrating equivalence is required. In addition, the manufacturing site's burn-in data and performance history will be essential criteria for burn-in modification approval.

* 4.3.2 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. t_{MD} shall be 70µs maximum, t_H for $Z_{\Theta JX}$ shall be 10ms. The thermal impedance limit shall comply with the thermal impedance graphs in figures 4, 5 and 6 (less than or equal to the curve value at the same t_H time) and 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.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with table V of MIL-PRF-19500, table I herein, and as specified herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in tables VIa (JANS) and VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and 4.4.2.1 and 4.4.2.2 herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein. Read and record the change in thermal impedance. The accept criteria is a maximum change of 10 percent for group B, subgroups 3 and 4 for JANS, or group B, subgroup 2 for JANTX or JANTXV.

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

Subgroup	Method	Conditions
B3	1056	0°C to 100°C, 25 cycles.
B3	1051	-55°C to 175°C, 100 cycles.
* B3	2101	Decap analysis; scribe and break only
B4	1037	V_R = rated V_{RWM}, T_A = room ambient as defined in 4.5 of MIL-STD-750, f = 50-60 Hz (see 4.5.2); t_{on} = t_{off} = 1 minute minimum; 2,000 cycles; I_O = 300 mA; in lieu of ac conditions, a dc condition of I_F = 300 mA may be used.
B5	1026	I_O = 400 mA minimum, V_R = rated V_{RWM}, f = 50-60 Hz (see 4.5.1). Option 1: Adjust I_O or T_A to obtain a minimum T_J of +225°C, t = 216 hours, n = 45, c = 0. Option 2: Adjust I_O or T_A to obtain a minimum T_J of 200°C, t = 1,000 hours, n = 45, c = 0.
B6	4081	L = .375 inch (9.53 mm); $R_{\Theta JL}$ = 150°C/W maximum, $R_{\Theta JEC}$ = 40°C/W maximum (see 4.3.2).

* 4.4.2.2 Group B inspection, table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Leaded samples from the same lot may be used in lieu of U and 'US' suffix sample for life test.

Subgroup	Method	Conditions
B2	1056	0°C to + 100°C, 10 cycles.
B2	1051	-55°C to +175°C, 45 cycles including screening.
B3	1026	$V_{(pk)}$ = rated V_{RWM}; f = 50-60 Hz; I_O = 300 mA dc minimum; adjust T_A or I_O to obtain a minimum T_J of +150°C. (See 4.5.1)
* B4	2101	Decap analysis; scribe and break only
B6	1032	T_A = +175°C.

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

* 4.4.3.1 Group C inspection, table V of MIL-PRF-19500.

Subgroup	Method	Conditions
* C2	1056	0°C to + 100°C, 10 cycles.
* C2	1051	-55°C to + 175°C, 45 cycles including screening.
C2	2036	Tension - test condition A; weight = 10 pounds, t = 15 s; lead fatigue = condition E (not applicable to U, US, and 'UB' suffix types).
C5	4081	L = .375 inch (9.53 mm), $R_{\Theta JL}$ = 150°C/W maximum; $R_{\Theta JEC}$ = 40°C/W; (see 4.3.2).
C6	1026	1,000 hours minimum, $V_{(pk)}$ = rated V_{RWM}; f = 50 - 60 Hz; I_O = 300 mA dc minimum; adjust T_A or I_O to obtain a minimum T_J of +150°C. (See 4.5.1)

* 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 IX of MIL-PRF-19500, and table II herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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

* 4.5.1 Free air power burn-in and life tests. The use of a current limiting or ballast resistor is permitted provided that each device under test still sees the full P_t (minimum) and that the minimum applied voltage, where applicable, is maintained through-out the burn-in period. Method 3100 of MIL-STD-750 shall be used to measure T_J.

4.5.2 Forward-recovery voltage and time. Forward recovery time shall be measured as the time interval between zero time and the point where the V_f pulse has decreased to 110 percent of the steady-state value of V_F when I_F = 300 mA dc. The maximum rise time of the response detector shall be 1 ns. The maximum forward recovery voltage (V_{fr}) during the forward recovery interval shall also be measured.

4.5.3 Scope display evaluation. Scope display evaluation shall be stable in accordance with method 4023 of MIL-STD-750. Scope display may be performed on automatic test equipment for screening only with the approval of the qualifying activity. Scope display in table I herein shall be performed on an oscilloscope. Reverse current (I_{BR}) over the knee shall be 100 μA peak.

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

* TABLE I. Group A inspection.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Thermal impedance	3101	See 4.3.2	$Z_{\Theta JX}$			°C/W
Forward voltage	4011	I_F = 10 mA dc pulsed	V_{F1}			
1N6638					0.8	V dc
1N6642					0.8	V dc
1N6643					0.8	V dc
Forward voltage	4011		V_{F2}			
1N6638		I_F = 200 mA pulsed			1.1	V dc
1N6642		I_F = 100 mA pulsed			1.2	V dc
1N6643		I_F = 100 mA pulsed			1.2	V dc
Breakdown voltage	4021	I_R = 100 µA dc	V_{BR}			
1N6638				150		V dc
1N6642				100		V dc
1N6643				75		V dc
Reverse current	4016	DC method; V_R = 20 V dc	I_{R1}		35	nA dc
1N6638					25	nA dc
1N6642					50	nA dc
1N6643						
Reverse current	4016	DC method	I_{R2}			
* 1N6638		V_R = 125 V dc			500	nA dc
* 1N6642		V_R = 75 V dc			500	nA dc
* 1N6643		V_R = 50 V dc			500	nA dc
Subgroup 3						
High temperature operation		T_A = +150°C				
Reverse current	4016	DC method, V_R = 20 V dc	I_{R3}			
1N6638					50	µA dc
1N6642					50	µA dc
1N6643					75	µA dc

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 3 - Continued						
Reverse current	4016	DC method	I_{R4}			
1N6638		V_R = 125 V dc			100	µA dc
1N6642		V_R = 75 V dc			100	µA dc
* 1N6643		V_R = 50 V dc			100	µA dc
Forward voltage	4011	I_F = 10 mA dc pulsed	V_{F3}			
1N6638					0.65	V dc
1N6642, 1N6643					0.80	V dc
Low temperature operation		T_A = -55°C				
Forward voltage	4011	Pulsed	V_{F4}			
1N6638		I_F = 200 mA pulsed			1.2	V dc
1N6642		I_F = 100 mA pulsed			1.2	V dc
1N6643		I_F = 100 mA pulsed			1.4	V dc
Subgroup 4						
Capacitance	4001	V_R = 0 V dc; V_{sig} = 50 mV(p-p) f = 1 MHz	C_{T1}			
1N6638					2.5	pF
1N6642					5.0	pF
1N6643					5.0	pF
Capacitance	4001	V_R = 1.5 V dc; V_{sig} = 50 mV(p-p) f = 1 MHz	C_{T2}			
1N6638					2.0	pF
1N6642					2.8	pF
1N6643					2.8	pF
Reverse recovery time	4031	Condition A, I_F = I_R = 10 mA dc	t_{rr}			
1N6638					4.5	ns
1N6642					5.0	ns
1N6643					6.0	ns
Scope display	4023	Figure 4023-3, -7, -9, -10 only				
Subgroup 5						
Not applicable						

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 6						
Surge current	4066	I_{FSM} = 2.5 A(pk) ten surges at one per minute (max) surge duration of 1/120 seconds				
Electrical measurements		See table I, subgroup 2.				
Subgroup 7						
Forward recovery voltage and time	4026	I_F = 200 mA dc (see 4.5.2)	V_{fr} t_{fr}		5.0 20.0	V(pk) ns

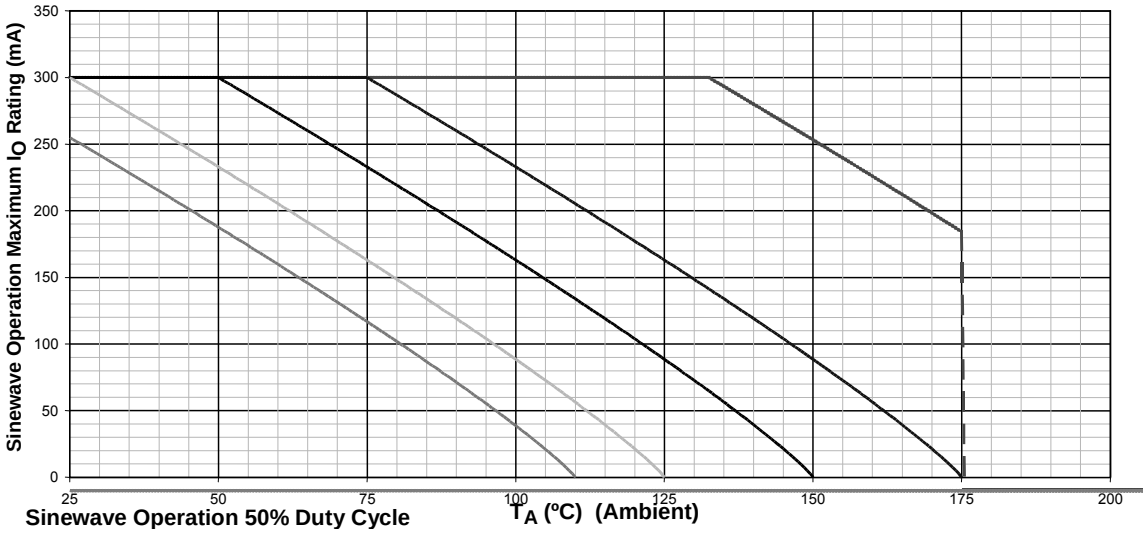
1/ For sampling plan, see MIL-PRF-19500.
2/ Electrical characteristics for "U", “UBx” and "US" suffix versions are identical to the corresponding non "U", ”UBx” and "US" suffix versions unless otherwise noted

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

Inspection	MIL-STD-750		Qualification inspection
	Method	Conditions	
Subgroup 1			n = 45, c = 0
Thermal shock (glass strain) 1/	1056	20 cycles, condition D except low temperature shall be achieved using liquid nitrogen (-195°C). A visual inspection for cracked glass shall be performed.	
Temperature cycling 1/	1051	-65°C to +175°C, 500 cycles.	
Hermetic seal	1071	Gross leak only	
Electrical measurement		See table I, subgroup 2	
Subgroup 2			
Not applicable			
Subgroup 4			
Thermal impedance curves		A histogram of thermal impedance ($Z_{\Theta JX}$ and $R_{\Theta JX}$) is required on 116 devices using the supplier proposed optimal test conditions and thermal impedance limit. The approved thermal impedance conditions and limit for $Z_{\Theta JX}$ shall be used by the supplier in screening and for endpoint measurements as applicable. The approved thermal impedance conditions for $Z_{\Theta JX}$ shall be used by the supplier for all conformance inspection. Each supplier shall submit a thermal impedance ($Z_{\Theta JX}$) log-log plot using the best device, the worst device and the average device from the 116 devices histogram. In addition, the maximum thermal impedance limit curve from the slash sheet shall be included for reference to demonstrate that all curves conform. These four thermal impedance plots will all reside on a single log-log graph and will extend from DC steady state down to at least 1ms of heating pulse time.	
Subgroup 5			n = 22, c = 0
Potted environment test	1054	Not applicable for 'UB' packages	
Subgroup 6			n = 3, c = 0
ESD	1020		
Subgroup 8			n = 45
Resistance to glass cracking	1057	Test condition B. Test until failure occurs or to a maximum of 25 cycles, whichever comes first.	

1/ Separate samples may be used for each test.

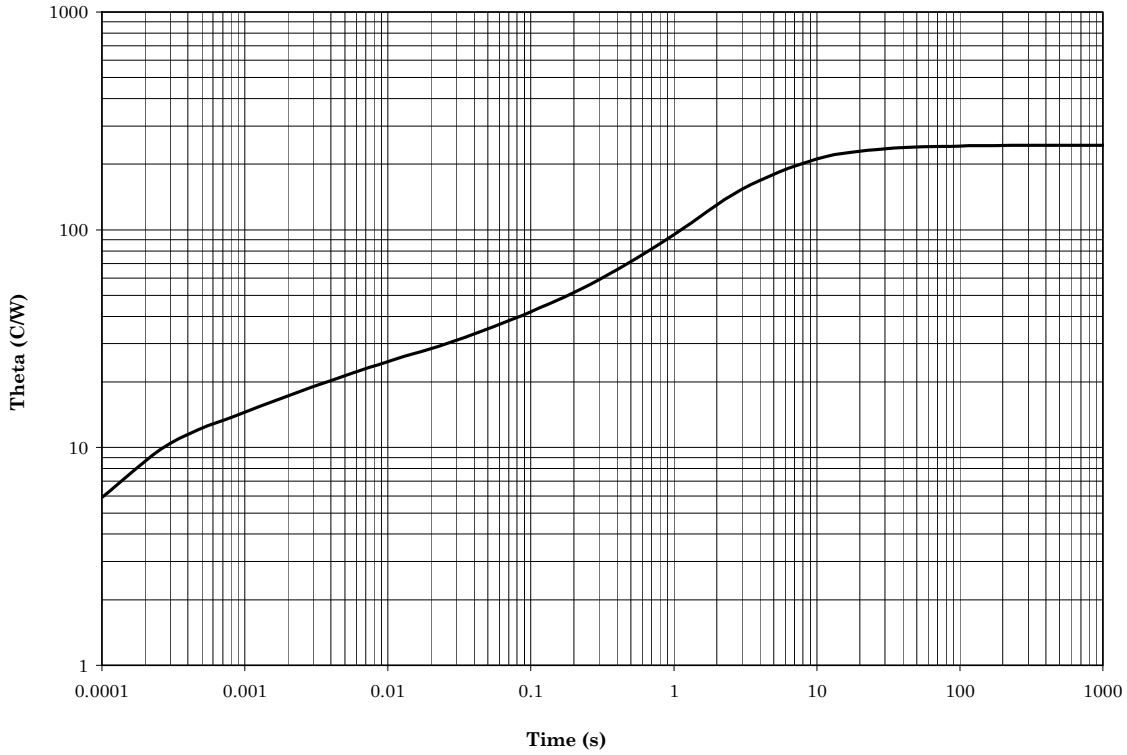
TEMPERATURE – CURRENT DERATING CURVE
DO-35 or DO-213AA parts T_A = 25°C



NOTES:
1. Top curve is thermal runaway loci and cannot be used as a derate design curve since it exceeds the maximum ratings for this part. Operating under this curve using these mounting conditions assures device will not have a thermal runaway. This is the true inverse of the worst-case thermal resistance value extrapolated out to the thermal runaway point.
2. Derate design curve constrained by the maximum junction temperatures and current rating specified. (See 1.3.)
3. Derate design curve chosen at $T_J \leq 150°C$, where the maximum temperature of electrical test is performed.
4. Derate design curves chosen at $T_J \leq 125°C$, and 110°C to show power rating where most users want to limit T_J in their application.

* FIGURE 5. Temperature current derating.

Maximum Thermal Impedance Plots
DO-35 or DO-213AA parts, T_A = 55°C

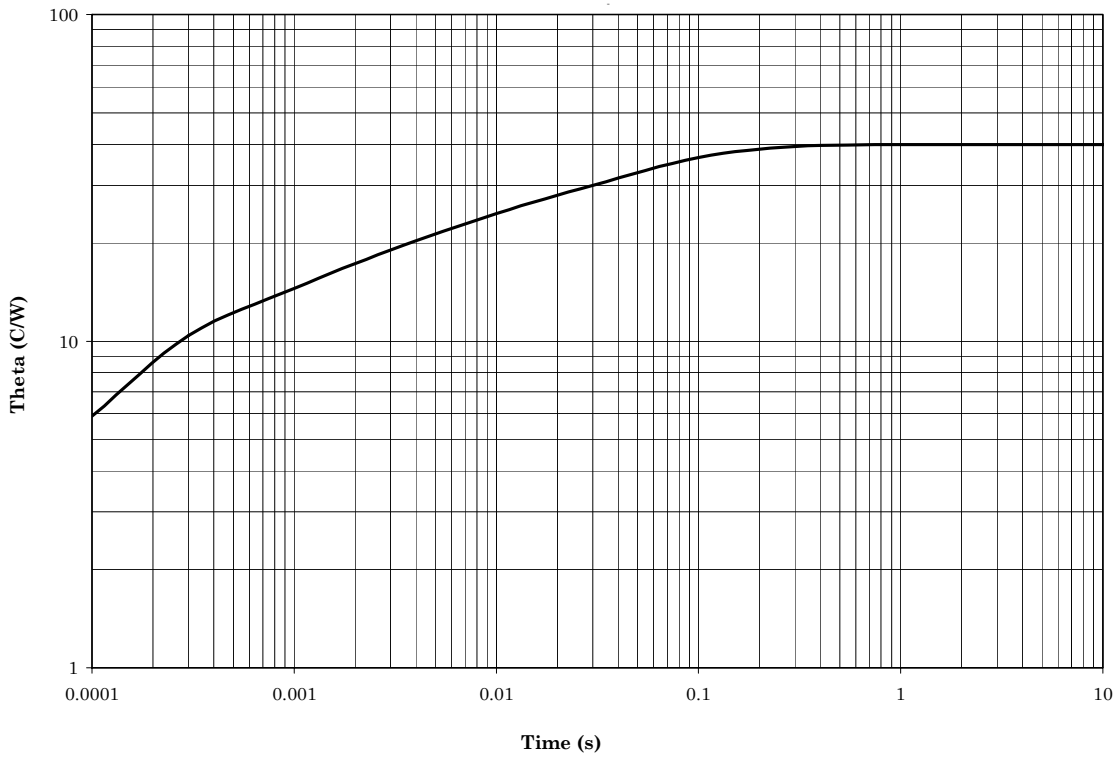


$R_{\Theta JA}$ = 250°C/W

1/ $Z_{\Theta JX}$ = 25°C/W maximum at t_H = 10ms.

* FIGURE 6. Thermal impedance - all glass devices.

Maximum Thermal Impedance Plots
DO-213AA parts, T_{EC} = 25°C

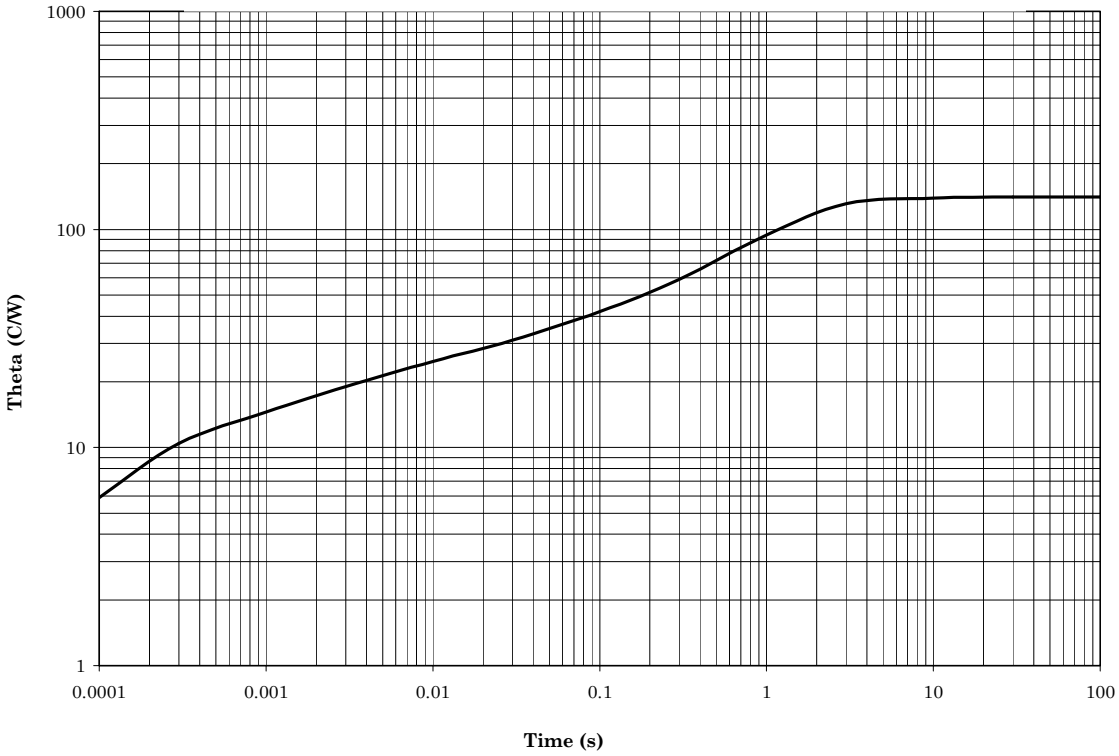


$R_{\Theta JEC}$ = 40°C/W

1/ $Z_{\Theta JX}$ = 25°C/W maximum at t_H = 10ms.

* FIGURE 7. Thermal impedance - all 'US' devices.

Maximum Thermal Impedance Plots
DO-35 parts, T_L = 25°C



$R_{\Theta JL}$ = 150°C/W

1/ $Z_{\Theta JX}$ = 25°C/W maximum at t_H = 10ms.

* FIGURE 8. Thermal impedance - all axial lead devices.

LS = Lead spacing = .375 inch (9.53 mm) for non-surface mount devices and 0 inch for surface mount devices as defined as follows:

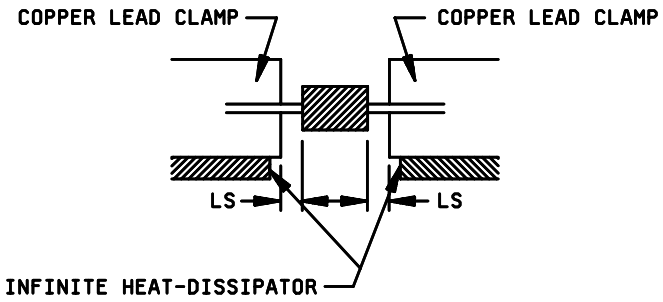


FIGURE 9. Mounting arrangement.

5. PACKAGING

* 5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual 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.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

* 6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Packaging requirements (see 5.1).

c. Lead finish (see 3.4.1).

d. Product assurance level and type designator.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML-19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43216-5000 or e-mail vqe.chief@dla.mil.

* 6.4 Cross reference substitution list. JANS1N4148-1 design is unsuitable for space flight applications and is therefore prohibited and will no longer be built or qualified. Devices in stock are acceptable provided the date code does not exceed 9208. A PIN for PIN replacement table follows, and these devices are directly interchangeable. The JANS1N6642 will be used in place of the JANS1N4148-1. The 1N6638US, 1N6642US, and 1N6643US are directly substitutable for the 1N6638U, 1N6642U, and 1N6643U.

Non-preferred PIN	Preferred PIN
JANS1N4148-1 JANS1N4148UR-1 JANS1N6638U JANS1N6642U JANS1N6643U	JANS1N6642 JANS1N6642US JANS1N6638US JANS1N6642US JANS1N6643US

6.5 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 - 11
DLA - CC
NASA - NA

Review activities:
Army - AR, MI, SM
Navy - AS, MC
Air Force - 19, 71, 99

Preparing activity:
DLA - CC

(Project 5961-2005-035)

* 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 http://assist.daps.dla.mil.