INCH POUND

MIL-PRF-19500/691
16 July 2001

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, DIODE, SILICON, SWITCHING,
1N4148UE2
JAN, JANTX, AND JANJ

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

1. SCOPE

1.1 Scope. This specification covers the performance requirements for switching diodes. Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (SOD-123).

1.3 Maximum ratings. T_A = +25°C.

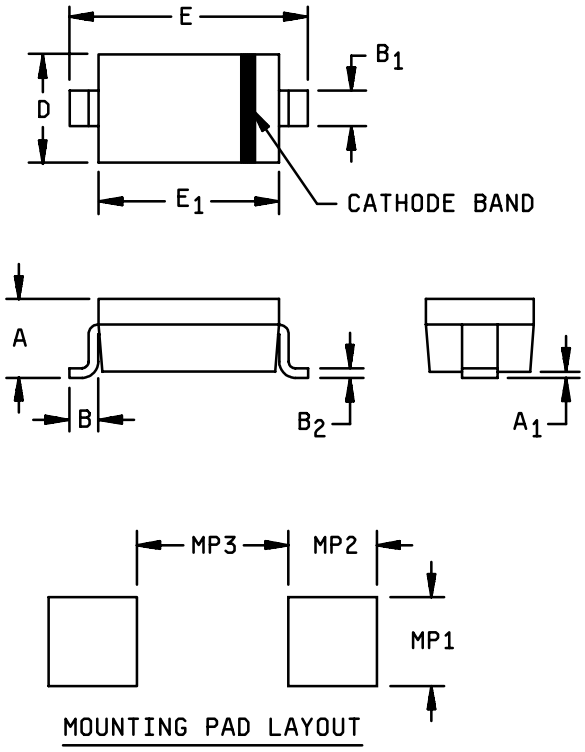
Types	V_{BR}	V_{RWM}	I_O (1)	I_{FSM} t_p = 1/120 s	T_{STG}, T_J	$R_{\theta A}$ L = 0 (2)
	V (pk)	V (pk)	mA	mA (pk)	°C	°C/W
1N4148UE2	100	75	150	500	-50 to +150	450

(1) Average rectified current half wave rectification with resistive load, f ≥ 50Hz. Valid provided that electrodes are kept at T_A = +25°C.
(2) Derating above +25°C is 2.2mW/°C.

1.4 Primary electrical characteristics at T_A = +25°C.

Types	V_{F1} I_F = 10 mA	V_{F2} I_F = 100mA	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 = 50mA	t_{rr} I_R = I_F = 10 mA I_{rec} = 1mA	C_{T1} V_R = 0 V_F = 0
	V dc	V dc	nA dc	µA dc	µA dc	µA dc	ns	ns	pF
1N4148UE2	1	1.2	25	0.5	50	100	20	5.0	5

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A		.053		1.35	
A1		.004		0.1	
B		.010		0.25	
B1		.022		0.55	
B2		.006		0.15	
D	.055	.067	1.40	1.70	
E	.140	.152	3.55	3.85	
E1	.100	.112	2.55	2.85	
MP1		.055		1.40	
MP2		.055		1.40	
MP3		.094		2.40	

TYPE 1N4148UE2

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

FIGURE 1. Physical dimensions (SOD - 123).

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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement there to, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARD

DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Services (DAPS), Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

JEDEC Standard 20 - Moisture Reflow Sensitivity Classification for Surface Mount Devices.
JESD22-A101 - Steady State Temperature Humidity Bias Life Test.
JESD22-A102 - Autoclave.
JESD22-A103 - High temperature storage life.
JESD22-A112 - ESD Testing.
JESD22-A113 - Preconditioning.

(Applications for copies should be addressed to the Electronics Industries Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents may also be available in or through libraries or other informational services.)

2.4 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.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

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 and as follows.

FIT - Failure in time.
UE2 - Unleaded encapsulated plastic over epoxy wire bonded frame (non-hermetic).

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500, and figure 1 herein.

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

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

3.6 Electrical test requirements. The electrical test requirements shall be group A as specified herein.

3.7 Marking. Marking shall be in accordance with MIL-PRF-19500, except as specified herein. The part marking shall consist of an abbreviated date code (Y, M), manufacturer code (m), and part number code (A) due to space limitations (see figure 2).

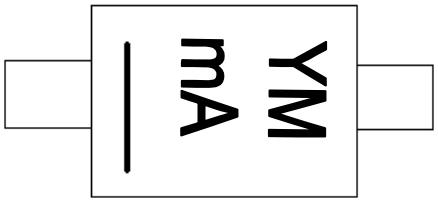


FIGURE 2. Part marking orientation.

3.7.1 Date code. The date code shall be as follows:

a. 1st character: Designator of the manufacturing year, where Y will be "M" through "Z" to indicate the year. The sequence starts back at "A" after the year 2011. This sequence will repeat every 24 years. Letters "I" and "O" will not be used.

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
M	N	P	R	S	T	U	V	W	X	Y	Z	A

b. 2nd character: Designator of the manufacturing month, where M will be "1" through "D" to indicate the month.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2	3	4	5	6	7	8	9	O	N	D

3.7.2 JAN brand. There is no JAN brand. Refer to the certificate of conformance or unit packaging for quality assurance level.

3.7.3 Manufacturers code. The "m" denotes the manufacturer. The letter "B" is assigned to manufacturer CAGE code 14936. Contact the preparing activity for new letter assignments.

3.7.4 Part code. The 'A' is the part number code on a SOD-123 for a 1N4148UE2.

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 JANJ qualification. For JANJ qualification, 4.4.2.1 herein shall be performed as required by the qualifying activity.

4.2.2 JANJ devices. For JANJ level, 3.3.1 through 3.3.1.3 of MIL-PRF-19500 shall apply, except as modified herein. Supplier imposed requirements as well as alternate screens, procedures, and/or controls shall be documented in the QM plan and must be submitted to the qualifying activity for approval. When alternate screens, procedures, and/or controls are used, in lieu of the JANJ screens herein equivalency shall be proven and documented in the QM plan. Radiation characterization may be submitted in the QM plan at the option of the manufacturer, however, 3.3.1.1 of MIL-PRF-19500 is not required. Die lot control and rework for JANJ shall be in accordance with the JANS requirements of 3.13 and D3.13.2.1 of MIL-PRF-19500. Lot formation and conformance inspection requirements for JANJ shall be those used for JANTXV devices as a minimum.

4.3 Screening (JANJ, JANTX). For appendix D qualified suppliers, screening shall be in accordance with table 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. For appendix C qualified suppliers (QML), and for JANJ, refer to QM plan for screening requirements. The level of screening for screens 3a, 10, and 12 will be determined based on the reliability FIT level (see 4.3.1).

Screen (see table IV of MIL-PRF-19500)	Measurement		
	JANS Level (for reference only)	JANJ Level	JANTX Level
1a	Required	Required	Not required
1b	Required	Required	Not required
2	Not required	Not required	Not required
3a	Required	Required	Required
3b	Not applicable	Not applicable	Not applicable
(1) 3c	Thermal impedance (see 4.3.3)	Thermal impedance (see 4.3.3)	Thermal impedance (see 4.3.3)
4	Not applicable	Not applicable	Not applicable
5	Not applicable	Not applicable	Not applicable
6	Not applicable	Not applicable	Not applicable
7a	Not applicable	Not applicable	Not applicable
7b	Not applicable	Not applicable	Not applicable
8	Required	Wafer level traceability	Not required
9	$I_{R1,}$ V_{F1}	$I_{R1,}$ V_{F1}	I_{R1}
10	Method 1039 of MIL-STD-750, condition A 48 hrs minimum	Method 1039 of MIL-STD-750, condition A 48 hrs minimum	Method 1039 of MIL-STD-750, condition A 48 hrs minimum
11	V_{F1}, I_{R1}; $\Delta I_{R1} \pm 15$ nA dc or <100 percent of initial value whichever is greater. $\Delta V_{F1} = \pm 0.020$ V dc	V_{F1}, I_{R1}; $\Delta I_{R1} \pm 15$ nA dc or <100 percent of initial value whichever is greater. $\Delta V_{F1} = \pm 0.020$ V dc	V_{F1},I_{R1}
12	Required 240 hours minimum See 4.3.2	Required 240 hours minimum See 4.3.2	Required 96 hours minimum See 4.3.2
13a	Subgroups 2 of table I herein; $\Delta V_{F1} = \pm 0.020$ V dc ΔI_{R1} = <100 percent of initial value or 15 nA dc, whichever is greater. Reverse scope display evaluation (see MIL-STD-750, method 4023)	Subgroups 2 of table I herein; $\Delta V_{F1} = \pm 0.020$ V dc ΔI_{R1} = <100 percent of initial value or 15 nA dc, whichever is greater. Reverse scope display evaluation (see MIL-STD-750, method 4023)	Subgroup 2 of table I herein; $\Delta V_{F1} = \pm 0.020$ V dc ΔI_{R1} = 100 percent of initial value or 15 nA dc, whichever is greater. Reverse scope display evaluation (see MIL-STD-750, method 4023)
13b	Group A, subgroup 3	1) 100 percent in-line electricals at +85°C 2) Group A, subgroup 3, high temp, 100 percent 3) Group A, subgroup 3, low temp, n = 116, c = 0	Not required
14a	Not applicable	Not applicable	Not applicable
14b	Not applicable	Not applicable	Not applicable
15	Required	Required	Not required
16	Required	Required	Not required

(1) Thermal impedance shall be performed any time after screen 3.

4.3.1 QML JANTX, JANJ screening requirements. The level of screening will be determined by demonstration of reliability performance. The reliability models and methods will be in accordance with the models below. The table below will be used to determine the level of screening for the individual screens based on the reliability performance. NOTE: Each screen test will be determined individually by the reliability performance demonstrated. As an example there can be a demonstrated performance of temperature cycle to a level below $< 6x10^{-9}$ which would result in a screen of the group B temperature cycle test at a n = 116, c = 0, but the HTRB may only demonstrate a reliability level of ≤ 10, > 1, which would require a screen of group B, n = 500, c = 0. Confidence level will be 60 percent.

Screen Test	Reliability Model (1) (2) (3)	Constants for Model	Unit of measure	Level	Screen level
Temp cycle 3a	Coffin Manson	M = 4 <T use = 55°C	Failure / cycle	$> 6x10^{-8}$	4.3, screening 100 percent (JANJ, JANTX)
				$\leq 6x10^{-8}$, $> 6x10^{-9}$	Group B, n = 500 c = 0
				$< 6x10^{-9}$	Group B, n = 116 c = 0
HTRB 10	Arrhenious	Ea = .7 T_J use = 55°C	FIT	> 10	4.3, screening 100 percent (JANJ, JANTX)
				≤ 10, > 1	Group B, n = 500 c = 0
				< 1	Group B, n = 116 c = 0
OP Life 12	Arrhenious	Ea = .7 T_J use = 55°C	FIT	> 10	4.3, screening 100 percent (JANJ, JANTX)
				≤ 10, > 1	Group B, n = 500 c = 0
				< 1	Group B, n = 116 c = 0
13b	Group A, subgroup 3 will be in accordance with 4.3, screening table for JANJ				

(1) Thermo-mechanical Effects (Coffin-Manson):

$$A_f = \left(\frac{\Delta T_t}{\Delta T_u} \right)^m$$

A_f = acceleration factor
ΔT_t = thermal cycle temperature change in the test environment
ΔT_u = thermal cycle temperature change in the use environment
m = constant, typical value for a given failure mechanism or derived from empirical data

(2) Thermal Effects (Arrhenius):

$$A_f = \exp\left[\frac{E_a}{k} \bullet \left(\frac{1}{T_u} - \frac{1}{T_t} \right) \right]$$

T_u = use environment junction temperature (in °K)
T_t = test environment junction temperature (in °K)
A_f = acceleration factor
k = Boltzman's Constant (8.6171 x 10^{-5} eV)
E_a = activation energy, typical value for a given failure mechanism or derived from empirical data

(3) Failure Rate Estimating Methodology:

$$\lambda = \frac{\chi^2(\alpha, d.f.)}{2 \bullet A_f \bullet t} \bullet 10^9$$

λ = failure rate (Failures-In-Time)
χ^2 = chi-square function
α = (100 - confidence level) / 100
d.f. = (2n + 2) degrees of freedom
n = number of failures
A_f = acceleration factor
t = (sample size x total test time) device-hours

4.3.2 Power burn-in conditions. Power burn-in conditions are as follows: Method 1038 of MIL-STD-750, condition B, T_A = room ambient as defined in the general requirements of MIL-STD-750, (see 4.5); V_R = rated V_{RWM}; f = 50-60 Hz; I_O = 150 mA. An alternative of I_F (dc) = 150 mA may be used (at T_A = room ambient as defined in the general requirements of MIL-STD-750, see 4.5).

4.3.3 Thermal impedance $Z_{\theta JX}$ or measurements for screening. The $Z_{\theta JX}$ measurements shall be performed in accordance with method 3101 of MIL-STD-750. The maximum limit and conditions for $Z_{\theta JX}$ in screening (table IV of MIL-PRF-19500) shall be derived statistically by each vendor by means of actual measurements which characterize the die attach process (not to exceed the group A limit.)

4.4 Conformance inspection. For appendix D qualified suppliers, conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein. For appendix C qualified suppliers (QML), and for JANJ, refer to QM plan for "On-Going Reliability Monitor Requirements".

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, group A, subgroup 2 herein. The following test conditions shall be used for ΔV_f , group A inspection.

a. I_H forward heating current .....600 mA.

b. t_H heating time .....20 ms.

c. I_M measure current .....10 mA.

d. t_{MD} measurement delay time .....5 ms.

The maximum limit for ΔV_f under these test conditions is = 120 mV.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified in 4.4.2.1 for JAN, JANTX, and JANJ and as follows. Electrical measurements (end-points) for JAN, JANTX and JANJ shall be as specified below. Delta requirements shall be as specified below and shall be the steps of table III herein.

Step	Method	Condition
0		Preconditioning: 1-Dipping of devices in a perfluoropolyter liquid: 10 sec. +150°C 2 times 2-Rinse of devices in deionized water 3-Dry of the devices at T_A
	1051	4-Thermal cycle: condition G, 100cycles.
1	2026	Solderability: n = 15, c = 0.
2	1051	Temp. cycle: Condition G, 25 cycles, n = 45, c = 0.
3	JESD22-A102	Autoclave: Condition C, 96 hours, n = 45, c = 0.
4	2031	Solder heat: T = +260°C, 10 sec., n = 20, c = 0.
5		PCB simulation.
6	1032	T_A = +150°C.
7	1038	HTRB: Condition A, +150°C minimum, 240 hours, 80 percent rated V_{RWM}, n = 45, c = 0.
8	1038	Steady-state operation life: Condition B, T_J = +150°C minimum, 340 hrs, 80 V, 200 mA, T_A = +45°C, n = 45, c = 0.
	Electrical measurements	Group A, subgroup 2.
	Delta shift	See table III.

4.4.2.1 Group B sample selection. Separate samples may be used for each step. In the event of a group B failure, the manufacturer may pull a new sample at double size from either the failed assembly lot or from another assembly lot from the same wafer lot. If the new “assembly lot” option is exercised, the failed assembly lot shall be scrapped. Samples selected for group B inspection for JAN and JANTX shall be selected randomly from a minimum of three wafers (or from each wafer in the lot). JANJ samples will be from each wafer. When the QML screening option is used, (see 4.3.1) the tests used will replace the tests in group B, but the remainder of group B will be performed.

4.4.3 Group C inspection, JAN, JANTX, and JANJ. Group C inspection (JAN, JANTX, and JANJ) shall be as specified in 4.4.3.1 and shall include tests which are performed periodically. Group C test on each structurally identical device grouping shall be performed on devices from each three months production (once per quarter) of devices (based on inspection lot identification codes) for each assembly location and die attach method. When there is a JANJ lot available the JANJ lot will be selected for the sample. Electrical measurements (end-points) shall be as specified below and in accordance with group A, subgroup 2 herein. Delta requirements shall be as specified below and shall be the steps of table III herein. The sample size for each of these steps is: 45 devices, c = 0. Separate samples may be used for each step. For rules on resubmission for failed steps, see MIL-PRF-19500 rules on resubmission of failed subgroups.

4.4.3.1 Group C inspection, (JAN, JANTX, JANJ). Separate samples may be used for each step.

Step	Method	Condition
0		Preconditioning: 1-Dipping of devices in a perfluoropolyter liquid: 10 sec. +150°C, 2 times. 2-Rinse of devices in deionized water. 3-Dry of the devices at T_A.
	1051	4-Thermal cycle: condition G, 100 cycles.
1	JESD22-A103	Low temp storage: -50°C, 1,000 hours.
2	1051	Temp. cycle: Condition G, 1,000 cycles.
3	JESD22-A102	Autoclave: Condition C, 96 hours.
4	JESD22-A101	Moisture resistance (85/85 biased): 50V, 1,000 hours.
5		PCB simulation.
6	1032	High temp storage T_A = +150°C, 1,000 hours.
7	1038	HTRB: Condition A, +150°C minimum, 80V, 1,000 hours.
8	1038	Steady-state operation life: Condition B, T_J = +150°C minimum, 1,000 hours, 80V, 200 mA, T_A = +45°C.
	Electrical measurements	Group A, subgroup 2.
	Delta shift	See table III.

4.4.3.2 Group C sample selection. Samples for subgroups in group C shall be in accordance with MIL-PRF-19500.

4.4.4 Group E inspection. Group E inspection shall be performed for qualification or re-qualification only. The tests specified in table II herein must be performed to maintain qualification.

4.5 Method 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 Life test. These tests shall be conducted with a half-sine waveform 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 be neither greater than 180 degrees, nor less than 150 degrees.

4.5.3 Forward-recovery voltage and time. Forward recovery time shall be measured as the time interval between zero time and the point where the pulse has decreased to 110 percent of the steady-state value of V_F when I_F = 50 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.

4.5.4 Thermal resistance. Thermal resistance measurement shall be performed in accordance with method 3101 or 4081 of MIL-STD-750. Forced moving air or draft shall not be permitted across the devices during test. The maximum limit for $R_{\theta JA}$ under these test condition shall be $R_{\theta JA(max)}$ = 450°C/W. The following conditions shall apply:

a. I_H = 50 mA to 300 mA.

b. t_H = 25 seconds minimum.

c. I_M = 1 mA to 10 mA.

d. t_{MD} = 150 µs maximum.

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	$Z_{\theta JX}$		25.0	°C/W
Forward voltage	4011	I_F = 10 mA dc pulsed t_p = 5 ms max	V_{F1}		1.0	V dc
		I_F = 100 mA pulsed	V_{F2}		1.2	V dc
Breakdown voltage	4021	I_R = 100 µA dc	V_{BR}		100	V dc
Reverse current	4016	DC method; V_R = 20 V dc	I_{R1}		25	nA dc
Reverse current	4016	DC method, V_R = 75 V dc	I_{R2}		500	nA dc
Subgroup 3						
High temperature operation		T_A = +150°C				
Reverse current	4016	DC method, V_R = 20 V dc	I_{R3}		50	µA dc
Reverse current	4016	DC method, V_R = 75 V dc	I_{R4}		100	µA dc
Forward voltage	4011	I_F = 10 mA dc pulsed, V_R = 75 V dc, t_p = 5 ms maximum	V_{F3}		.80	V dc
Low temperature operation		T_A = -50°C				
Forward voltage	4011	Pulsed, I_F = 100 mA pulsed	V_F		1.2	V dc
Subgroup 4						
Capacitance	4001	V_R = 0 V dc; V_{sig} = 50mV (p-p); f = 1 MHz	C_{T1}		5	pF

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4 - Continued						
Capacitance	4001	V_R = 1.5 V dc; V_{sig} = 50 mV(p-p) f = 1 MHz	C_{T2}		2.8	pF
Reverse recovery time	4031	Condition A, I_F = Ir = 10 mA dc, I_R = 1 mA dc, C ≥ 1 nF; R = 1,000 Ω; $I_{r(rec)}$ = 1.0 mA dc	t_{rr}		5	ns
Subgroup 5						
Not applicable						
Subgroup 6						
Surge current 1N4148UE2	4066	I_{FSM} = 500 mA(pk) ten surges at one per minute (max) surge duration of 1/120 seconds				
Electrical measurements		See table I, group A, subgroup 2.				
Subgroup 7						
Forward recovery voltage and time	4026	I_F = 50 mA dc (see 4.5.2)	V_{fr} t_{fr}		5.0 20	V(pk) ns

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

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

Inspection	MIL-STD-750 (unless otherwise noted)		Qualification
	Method	Conditions	
Preconditioning	JESD22-A113 1/	Level 1	All
Subgroup 1			
Temperature cycling (air to air)	1051	Test condition G, 1,000 cycles	n = 77, c = 0
Electrical measurements		See group A, subgroup 2.	
Subgroup 2			
Steady state operation life	1039	1,000 hours, condition B.	n = 77, c = 0
HTRB	1039	1,000 hours, condition A.	n = 77, c = 0
Intermittent life	1037	Intermittent operation life: V = 80 V dc 200mA, 15,000 cycles, $\Delta T_J \geq +85°C$; forced air cooling allowed on cooling cycle only. 2' on 2' off.	n = 77, c = 0
Electrical measurements		See group A, subgroup 2.	
Subgroup 3			
Not applicable			
Subgroup 4			n = 77, c = 0
Moisture resistance	JESD22-A101 1/	1,000 hours	
Electrical measurements		See group A, subgroup 2.	
Subgroup 4b			n = 77, c = 0
Autoclave	JESD22-A102 1/	96 hours	
Electrical measurements		See group A, subgroup 2.	
Subgroup 5			
Thermal resistance	3131	See 4.5.4 and figure 3	n = 10, c = 0
Subgroup 6			
ESD	JESD22-A112 MM & HBM 1/		n = 30, c = 0 2 lots
Subgroup 7			
Moisture reflow sensitivity classification for surface mount devices	J-STD-20 1/		n = 100
Subgroup 8			n = 25 for 3 lots
Parametric characterization	Group A, subgroup 2	-50°C, 25°C, +100°C	

1/ Non-government standard document, see 2.3.

TABLE III. Groups B and C delta measurements.

Step	Inspection	MIL-STD-750		Symbol	Limit
		Method	Conditions		
1	Forward voltage	4011	t_p = 5 ms I_f = 10 mA pulsed	ΔV_{f1} 1/	Pre-test distribution to average +3σ and -3σ. Post-test distribution to average +4σ and -4σ of the pre-test results (not to exceed 100 percent of initial value or 25 mV dc maximum change.
2	Reverse current	4016	DC method V_r = 20Vdc	ΔI_{r1} 1/	Pre-test distribution to average +3σ and -3σ. Post-test distribution to average +4σ and -4σ of the pre-test results (not to exceed 20 nA dc whichever is greater.

1/ Devices which exceed the group A limits for this test shall not be accepted.

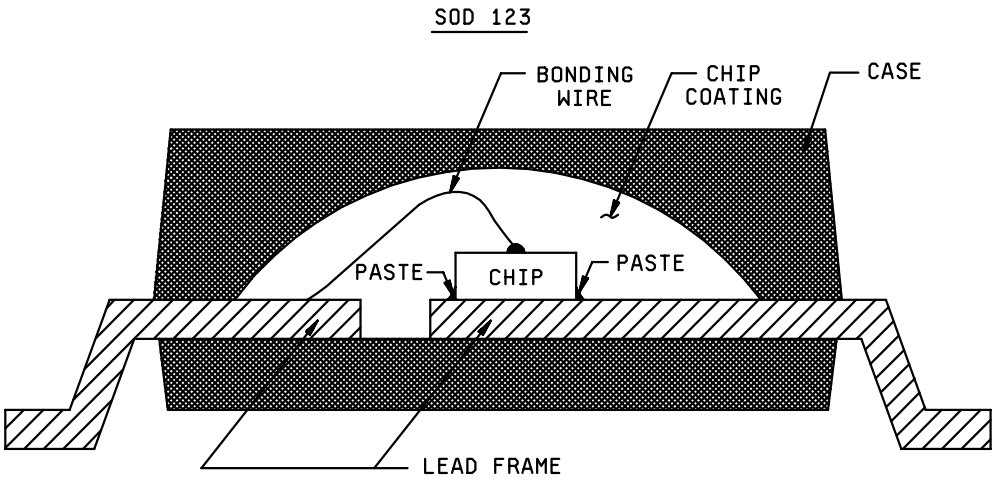


FIGURE 3. Sample construction.

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 personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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 must specify the following:7

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

b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).

c. Packaging requirements (see 5.1).

d. Lead finish (see 3.4.1).

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) 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.

Custodians:
Army - CR
Navy - NW
Air Force - 11
NASA - NA
DLA - CC

Review activity:
Army - MI

Preparing activity:
DLA - CC

(Project 5961-2429)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/691	2. DOCUMENT DATE 16 July 2001

3. **DOCUMENT TITLE**
SEMICONDUCTOR DEVICE, DIODE, SILICON, SWITCHING, 1N4148UE2 JAN, JANTX, AND JANJ

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial DSN FAX EMAIL 614-692-0510 850-0510 614-692-6939 alan_barone@dscc.dla.mil
c. ADDRESS Defense Supply Center Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman, Suite 2533, Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888