The documentation and process conversion measures necessary to comply with this revision shall be completed by 2 September 2004.

INCH-POUND
MIL-PRF-19500/444H
1 June 2004
SUPERSEDING
MIL-PRF-19500/444G
13 August 2003

* PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, SWITCHING, TYPES 1N5711-1, 1N5711UR-1, 1N5711UB, 1N5711UBCA, 1N5711UBD, 1N5711UBCC, 1N5712-1, 1N5712UR-1, 1N5712UB, 1N5712UBCA, 1N5712UBD, 1N5712UBCC, 1N6857-1, 1N6857UR-1, 1N6858-1, AND 1N6858UR-1, 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 Schottky barrier diodes. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figure 1, similar to DO-35, figure 2, DO-213AA, (UR) surface mount package, figure 3 (UB) surface mount, and figure 4, JANHC and JANKC.

1.3 Maximum ratings.

Type	V_{RWM}	I_{O1}	I_{O2} (1)	T_{STG} and T_J	$R_{\theta JL}$ L = .375 inch (9.52 mm) (2)	$R_{\theta JEC}$ (UR)	$R_{\theta JSP}$ (UBx)	ESDS class
	V(pk)	mA dc	mA dc		(leaded)	(UR)	(UBx)	
1N5711-1	50	33 (3)	5	-65°C to	250			1
1N5711UR-1	50	33 (4)	5	+150°C		100		1
1N5711UB	50	33 (4)	5				100	1
1N5711UBCA	50	33 (4)	5				100	1
1N5711UBCC	50	33 (4)	5				100	1
1N5711UBD	50	33 (4)	5				100	1
1N6858-1	50	75 (5)	10		250			2
1N6858UR-1	50	75 (6)	10			100		2
1N5712-1	16	75 (5)	20		250			1
1N5712UR-1	16	75 (6)	20			100		1
1N5712UB	16	75 (6)	20				100	1
1N5712UBCA	16	75 (6)	20				100	1
1N5712UBCC	16	75 (6)	20				100	1
1N5712UBD	16	75 (6)	20				100	1
1N6857-1	16	150 (7)	50		250			2
1N6857UR-1	16	150 (8)	50			100		2

See notes at end of table

* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, 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://ww.dodssp.daps.mil.

1.3 Maximum ratings – Continued.

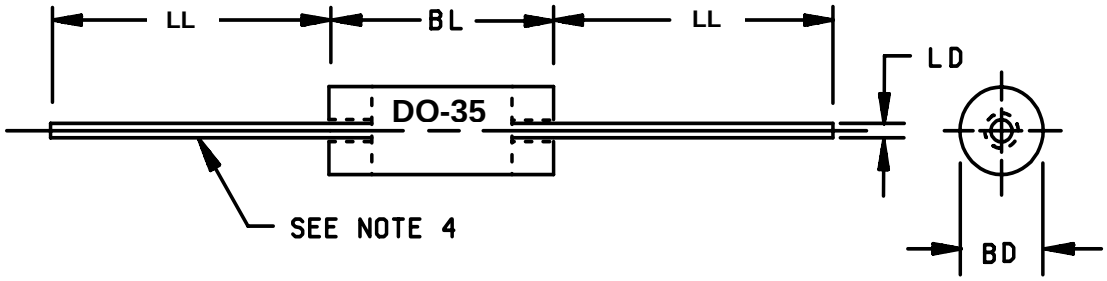
(1) Maximum I_O rating to ensure τ_{CL} compliance (< 100 ps).
(2) Lead length = .375 inch (9.52 mm).
(3) At T_L = +130°C and L = .375 inch, derate I_O to 0 at +150°C.
(4) At T_{EC} and T_{SP} = +140°C, derate I_O to 0 at +150°C.
(5) At T_L = +110°C and L = .375 inch, derate I_O to 0 at +150°C.
(6) At T_{EC} and T_{SP} = +130°C, derate I_O to 0 at +150°C.
(7) At T_L = +70°C and L = .375 inch, derate I_O to 0 at +150°C.
(8) At T_{EC} and T_{SP} = +110°C, derate I_O to 0 at +150°C.

1.4 Primary electrical characteristics.

Type (1)	$V_{(BR)1}$ I_R = 10 µA dc (min)	V_{F1} I_F = 1 mA dc (max)	V_{F2} I_F = 15 mA dc (max)	I_{R1} V_R = 50 V dc (max)	C V_R = 0, f = 1 MHz V_{sig} = 50 m V(pk) (max)	τ_{CL} (max)		$Z_{\theta JX}$ (max)
	V dc	V dc	V dc	nA dc	pF	ps	mA	°C/W
1N5711-1	70	0.410	1.0	200	2.0	100	5	40
1N6858-1	70	0.360	0.65	200	4.5	100	10	40

Type (1)	$V_{(BR)1}$ I_R = 10 µA dc (min)	V_{F1} I_F = 1 mA dc (max)	V_{F2} I_F = 35 mA dc (max)	I_{R1} V_R = 16 V dc (max)	C V_R = 0, f = 1 MHz V_{sig} = 50 mv(pk) (max)	τ_{CL} (max)		$Z_{\theta JX}$ (max)
	V dc	V dc	V dc	nA dc	pF	ps	mA	°C/W
1N5712-1	20	0.410	1.0	150	2.0	100	20	40
1N6857-1	20	0.350	0.75	150	4.5	100	50	40

(1) Electrical characteristics are for all package styles.

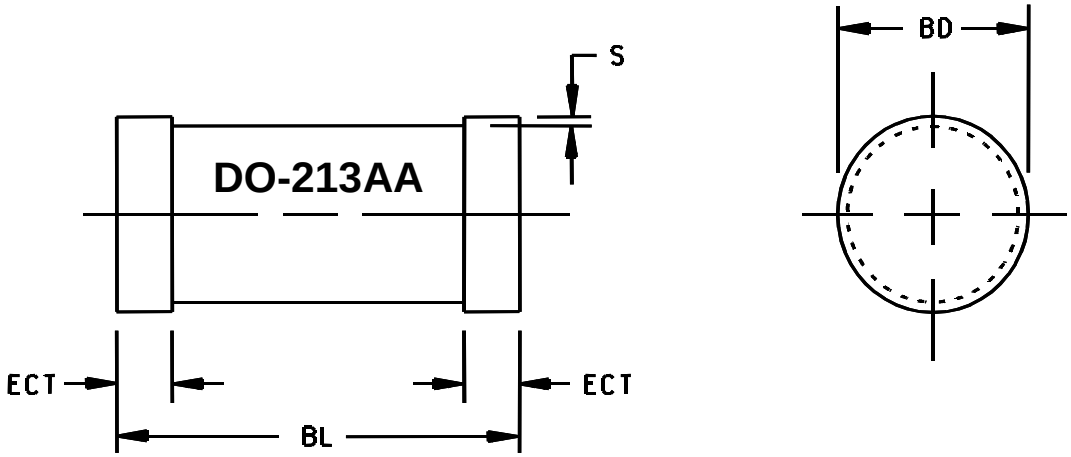


Dimensions					
	Inches		Millimeters		
Ltr	Min	Max	Min	Max	Notes
BD	.068	.076	1.73	1.93	2, 3
BL	.150	.170	3.81	4.32	2
LD	.014	.022	0.36	0.56	
LL	1.000	1.500	25.40	38.10	

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. Dimensions BL and LD include all components of the diode periphery except the sections of the leads over which the diameter is controlled.
3. Dimension BD shall be measured at the largest diameter.
4. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

1N5711-1, 1N5712-1, 1N6857-1 and 1N6858-1

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

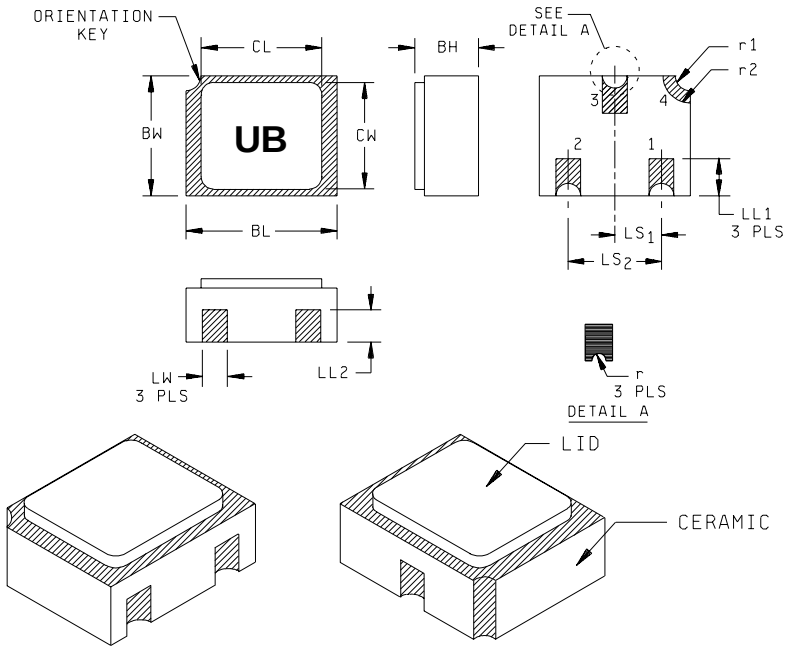


Dimensions					
Ltr	Inches		Millimeters		Notes
	Min	Max	Min	Max	
BD	.063	.067	1.60	1.70	
BL	.130	.146	3.30	3.71	
ECT	.016	.022	0.41	0.55	
S	.001 Min		0.03 Min		

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

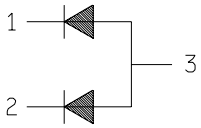
1N5711UR-1, 1N5712UR-1, 1N6857UR-1, and 1N6858UR-1

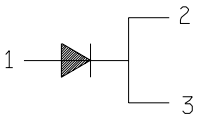
FIGURE 2. Physical dimensions, (DO-213AA).



Symbol	Dimensions				Note	Symbol	Dimensions				Note
	Inches		Millimeters				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
BH	.046	.056	1.17	1.42		LS1	.035	.040	0.89	1.02	
BL	.115	.128	2.92	3.25		LS2	.071	.079	1.81	2.01	
BW	.085	.108	2.16	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							

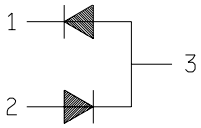
1N5711UBCA
1N5712UBCA

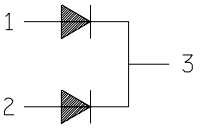




1N5711UB
1N5712UB

1N5711UBD
1N5712UBD

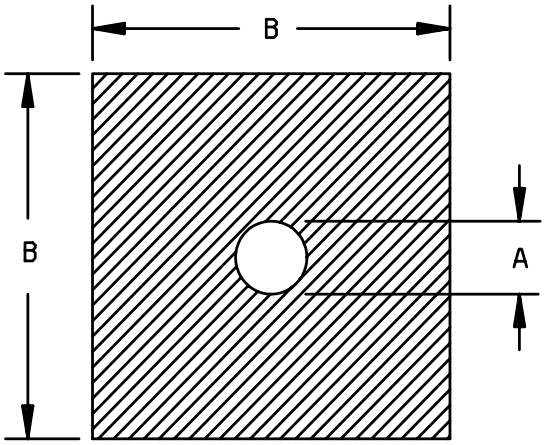




1N5711UBCC
1N5712UBCC

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
4. Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

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



1N5711 Dimensions					
	Inches		Millimeters		
Ltr	Min	Max	Min	Max	Notes
A	.004	.005	0.102	0.127	
B	.0130	.0170	0.330	0.432	

1N5712 Dimensions					
	Inches		Millimeters		
Ltr	Min	Max	Min	Max	Notes
A	.0029	.0035	0.074	0.089	
B	.0130	.0170	0.330	0.432	

1N6857, 1N6858 Dimensions					
	Inches		Millimeters		
Ltr	Min	Max	Min	Max	Notes
A	.0055	.0065	0.140	0.165	
B	.0130	.0170	0.330	0.432	

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
2. Element evaluation accomplished utilizing TO-5 package.
3. The physical characteristics of the die are:
   Metallization:
   Top (anode): Al.
   Back (cathode): Au.
   Al thickness: 25,000 Å minimum.
   Gold thickness: 4,000 Å minimum.
   Chip thickness: .010 inch (0.25 mm) ±.002 inch (0.05 mm).
4. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

FIGURE 4. Physical dimensions, JANHCA and JANKCA die.

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://www.dodssp.daps.mil/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

* 2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications 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.

DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER (DESC)

C68001 - Test Fixture for Effective Minority Carrier Lifetime.

(Copies of DESC Drawing C68001 are available from Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000 or e-mail ~~Semiconductor@dscc.dla.mil~~.)

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 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 and as follows.

EC	End-cap.
τ_{CL}	Effective carrier lifetime.
UR	Surface mount case outline, round end-cap.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500 and figures 1, 2, 3, and 4 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).

3.4.2 Diode construction. All devices (except UB version) shall be metallurgically bonded, double plug construction in accordance with the requirements of MIL-PRF-19500. All glass diodes shall be designed with sufficient thermal compensation in the axial direction to optimize tensile and compressive stresses. Dimensional analysis is required of all materials used to achieve axial thermal compensation. Dimensional tolerances and corresponding coefficient of thermal expansion (CTE) shall be documented on the DSCC Design and Construction Form 36D and shall be approved by the qualifying activity to maintain qualification. Dimensional tolerances shall be sufficiently tight enough to prevent excessive stresses due to the inherent CTE mismatch. The UB devices shall be eutectically mounted and wire bonded in a ceramic package.

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 table I as specified herein.

3.7 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.7.1 Polarity. The polarity of axial leaded devices shall be indicated with a contrasting color band to denote the cathode end. No color coding will be permitted.

3.7.2 UR devices. UR devices shall be marked with a cathode band only. Initial container package marking will be in accordance with MIL-PRF-19500.

3.7.3 UB devices. The part number may be reduced to J5711, JX5711, or JV5711. Manufacturer's identification and date code shall be marked on the devices.

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).

4.1.1 Sampling inspection. Sampling inspection shall be in accordance with MIL-PRF-19500.

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 qualification shall be performed herein for qualification or requalification only. In case qualification was awarded to a prior revision of the associated specification sheet that did not request the performance of table II tests, the tests specified in table II herein shall be performed on the first inspection lot to this revision to maintain qualification.

4.2.2 JANHC and JANKC devices. Qualification shall be in accordance with MIL-PRF-19500.

* 4.3 Screening (JANS). 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.

Screen (see table IV of MIL-PRF-19500)	Measurement
	JANS level
1a	Required
1b	Required
2	Not required
3a	Required
3b	Not applicable
(1) 3c	Required (see 4.3.3)
4	Not applicable
5	Required for UB
6	Not applicable
7a	Optional (required for UB)
7b	Optional
8	Required
9 and 10	Not applicable
11	Required I_{R1} and V_{F1}
12	Required, see 4.3.1
(2) 13	Required. Subgroup 2 and 3 of table I herein; $\Delta I_{R1} \leq$ 100 percent of initial reading or 25 nA whichever is greater; $\Delta V_{F1} \leq \pm$ 20 mV dc.
14a	Required for UB
14b	Required (3)
15	Required
16	Required

See notes at end of table.

* 4.3 Screening (JAN, JANTX, JANTXV) - Continued.

Screen (see table IV of MIL-PRF-19500)	Measurement	
	JANTXV and JANTX level	JAN level (4)
1a	Not required	Not required
1b	Required (JANTXV only)	Not required
2	Not required	Not required
3a	Required	Required in accordance with MIL-PRF-19500, JANTX level
3b	Not applicable	Not applicable
(1) 3c	Required (see 4.3.3)	Required (see 4.3.3)
4, 5, and 6	Not applicable	Not applicable
7a and 7b	Optional	Not required
8	Not required	Not required
9 and 10	Not applicable	Not applicable
11	Required I_{R1} and V_{F1}	Not applicable
12	Required. See 4.3.1, t = 48 hours	Not applicable
(2) 13	Subgroup 2 of table I herein; $\Delta I_{R1} \leq 100$ percent of initial reading or 50 nA whichever is greater; $\Delta V_{F1} \leq \pm 40$ mV dc.	Not applicable
14a	Required for UB	Not required
14b	Required	Required for UB
15 and 16	Not required	Not required

(1) Thermal impedance shall be performed any time after sealing provided temperature cycling is performed in accordance with table IV of MIL-PRF-19500, screen 3 prior to this thermal test.
(2) Test within 24 hours after removal from test.
(3) In accordance with MIL-PRF-19500.
(4) Screens 3a, 3c, and 14b are the only screens required for JAN level product.

4.3.1 Burn-in conditions. Burn-in conditions are as follows: High temperature reverse bias (HTRB), method 1038 of MIL-STD-750, test condition A, V_R = 40 V; T_A = +150°C (min.) for 1N5711, 1N6858. V_R = 12.8V T_A = +150°C (min) for 1N5712, 1N6857.

4.3.2 Screening (JANHC or JANKC). Screening of JANC die shall be in accordance with MIL-PRF-19500, "Discrete Semiconductor Die/Chip Lot Acceptance". Burn-in duration for the JANKC level follows JANS requirements; the JANHC follows JANTX requirements.

4.3.3 Thermal impedance ($Z_{\Theta JX}$ measurements). The $Z_{\Theta JX}$ measurements shall be performed in accordance with method 3101 of MIL-STD-750 to identify and remove atypical devices.

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 MIL-PRF-19500 and table I herein. The following test conditions shall be used for $Z_{\Theta JX}$, group A inspection:

a. I_M measurement current .....1 mA to 10 mA.

b. I_H forward heating current.....50 mA to 200 mA.

c. t_H 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 table VIa (for JANS) and table VIb (for JAN, JANTX, and JANTXV) 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 VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Condition
B2	1051	Required for UB.
B3	See 4.5.5	Preconditioning and deltas for temperature cycling.
B4	1037	I_{O1} at rated V_{RWM}; f = 60 Hz; T_A = room ambient as defined in 4.5 of MIL-STD-750; $t_{on} = t_{off}$ = 3 minutes minimum for 2,000 cycles.
B5	1038	HTRB in accordance with 4.3.1.
B6	3101 or 4081	$R_{\Theta JL}$ = 250°C/W .375 inch (9.52 mm) lead length (non-surface mount) $R_{\Theta EC}$ = 100°C/W (UR suffix devices).

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

Subgroup	Method	Condition
B2	See 4.5.5	Preconditioning and deltas for temperature cycling.
B2	1056	0°C to +100°C, 10 cycles, n = 22, c = 0.
B2	1051	-55°C to +150°C, 25 cycles, n = 22, c = 0 (Required for UB).
B3	1038	HTRB, in accordance with 4.3.1.
B4	2075	See 4.5.4 (Not applicable to UB).
B6	1032	T_A = +150°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.

Subgroup	Method	Condition
C2	See 4.5.5	Preconditioning and deltas for temperature cycling.
C2	1056	0°C to +100°C, 15 cycles, n = 22, c = 0.
C2	1051	-55°C to +150°C, 20 cycles, n = 22, c = 0 (Required for UB).
C2	2036	(Not applicable to surface mount devices); lead fatigue conditions: Test condition E; .062 inch (1.57 mm) lead restriction from case. Tension conditions: Test condition A; 4 pounds, 15 seconds.
C5	3101 or 4081	$R_{\Theta JEC}$, $R_{\Theta JSP}$ = 100°C/W (maximum), +25°C ≤ T_R ≤ +35°C, at T_H ≥ 25 seconds in still air. (See 4.5.3).
C5	3101 or 4081	$R_{\Theta JL}$ = 250°C/W (maximum) at .375 inch (9.52 mm) lead length, +25°C ≤ T_R ≤ +35°C, at T_H ≥ 25 seconds in still air. (See 4.5.3).
C6	1038	HTRB in accordance with 4.3.1.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IX of MIL-PRF-19500 appendix E and as specified herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein except, $Z_{\Theta JX}$ need not be performed after group E subgroup 2.

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

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

4.5.2 Effective carrier lifetime (τ_{CL}). This test shall be measured with the device installed in the test fixture, DESC Drawing C68001 using the test setup shown on figure 5 herein. Adjust the signal generator to 54 MHz. Adjust the sensitivity of the oscilloscope to 5 mV/cm (1N5711), 10mV/cm (1N6858), 20mV/cm (1N5712), and 50mV/cm (1N6857). With the device in the test fixture, adjust the output of the amplifier or VHF oscillator until the peak amplitude of the forward current is 5 cm as seen on the oscilloscope {5mA (1N5711), 10mA (1N6858), 20mA (1N5712), and 50mA (1N6857)}.

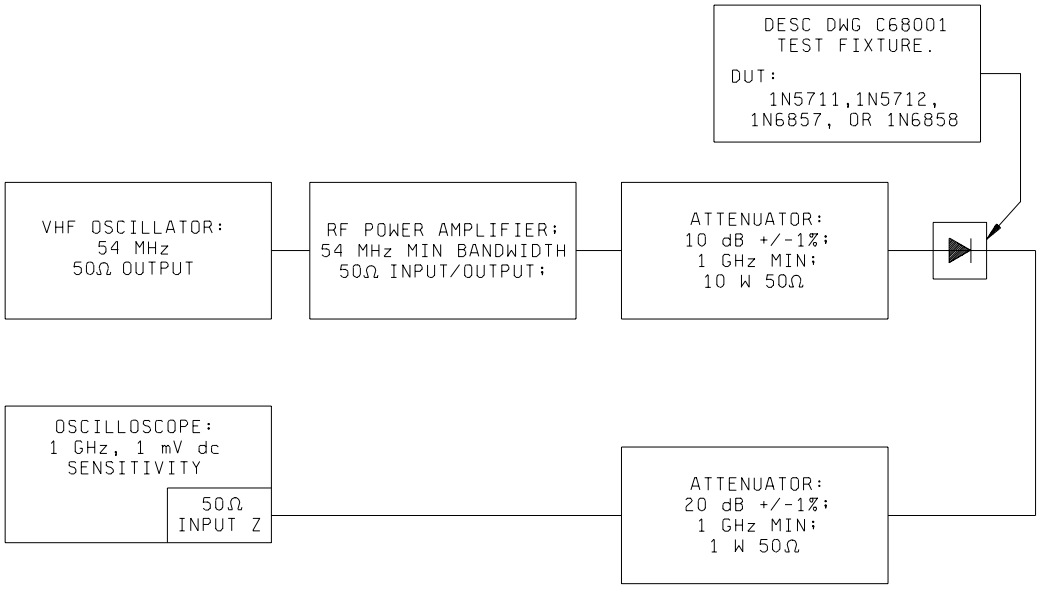


FIGURE 5. Test setup for diode effective lifetime measurement.

Change the sensitivity of scope to 2 mV/cm (1N5711, 1N6858), 5mV/cm (1N5712), or 10mV/cm (1N6857). Under these conditions, the effective carrier lifetime is related to the amplitude designated as "τ_{CL} " shown on figure 6. This amplitude has the calibration of 200 ps/cm (1N5711), 100ps/cm (1N6858), 125ps/cm (1N5712), and 100ps/cm (1N6857).

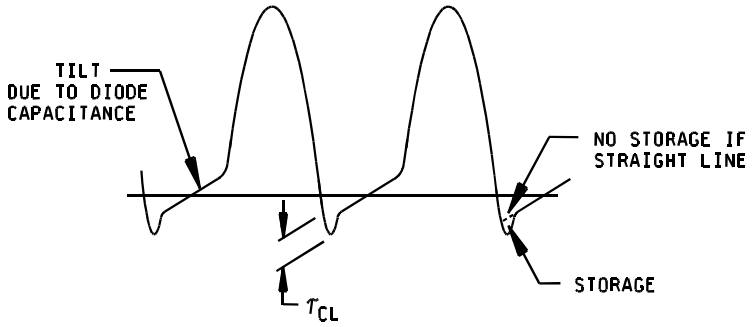


FIGURE 6. Oscilloscope display in diode effective lifetime measurement.

4.5.3 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 as shown in group E. The following conditions shall apply when using method 3101:

a. I_M ..... 1 mA to 10 mA.

b. I_H ..... 25 mA to 100 mA.

c. t_H ..... 25 seconds minimum.

d. t_{MD} ..... 70 µs maximum.

4.5.3.1 Temperature reference point, leaded devices: LS = lead spacing = .375 inch (9.52 mm) as defined on figure 7.

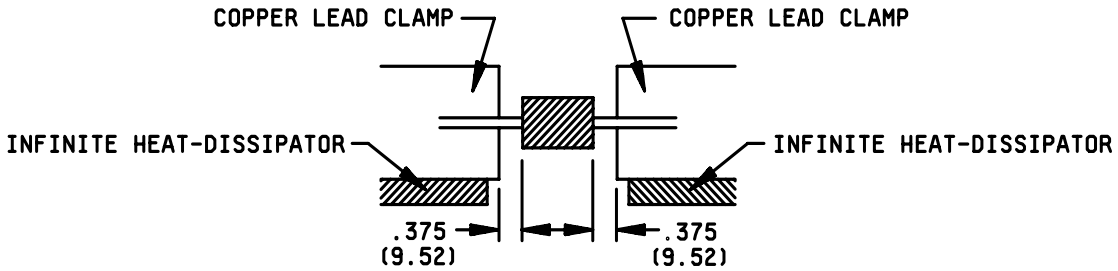


FIGURE 7. Mounting conditions.

* 4.5.4 Decap analysis (method 2101 for glass packages) scribe and break (not applicable to UB packages). Scratch glass at cavity area with diamond scribe. Carefully snap open. Using 30X magnification, examine the area where die (or bonding material) is in contact with the plugs, verify metallurgical bonding area.

* 4.5.5 Preconditioning and deltas for temperature cycling.

a. Read and record I_{R1}, V_{F2}, and $Z_{\Theta JX}$. Maintain device serialization throughout testing.

b. Immerse entire device into any suitable flux. Flux is used to prevent solder bridging across the terminations of device and to provide for a suitable contact needed for post electrical testing.

c. Immerse entire device in a horizontal position so that both terminations come in contact with the solder simultaneously. The device shall be immersed instantly and not gradually, and held completely immersed in the solder for 5 +2, -0 seconds. No dwell time over the solder pot shall be permitted. Maintain solder temperature to +260°C ±5°C.

d. The device shall be allowed to return to ambient prior to cleaning. Remove residue flux from the terminations by dipping the parts in isopropyl alcohol or other suitable solvent.

e. Test devices to method 1056 and 1051 of MIL-STD-750 and in accordance with MIL-PRF-19500.

f. Read and record I_{R1}, V_{F2}, and $Z_{\Theta JX}$, test subgroup 2 of table 1 herein.

g. Failure criteria: Subgroup 2 of table 1 herein. Calculate deltas between steps 4.5.5.a and 4.5.5.f, $\Delta I_{R1} \leq$ 100 percent of initial reading or 25 nA whichever is greater, $\Delta V_F \pm$ 20 mV, $\Delta Z_{\Theta JX} \pm$ 10 percent.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
1N5711-1, all packages						
Forward voltage	4011	I_F = 1 mA dc	V_{F1}		0.410	V dc
Forward voltage	4011	I_F = 15 mA dc	V_{F2}		1.0	V dc
Reverse current	4016	DC method; V_R = 50 Vdc	I_{R1}		200	nA dc
Breakdown voltage	4021	I_R = 10 μA dc	$V_{(BR)1}$	70		V dc
Thermal impedance	3101	See 4.3.3	$Z_{\Theta JX}$		40	°C/W
1N5712-1, all packages						
Forward voltage	4011	I_F = 1 mA dc	V_{F1}		0.410	V dc
Forward voltage	4011	I_F = 35 mA dc	V_{F2}		1.0	V dc
Reverse current	4016	DC method; V_R = 16 Vdc	I_{R1}		150	nA dc
Breakdown voltage	4021	I_R = 10 μA dc	$V_{(BR)1}$	20		V dc
Thermal impedance	3101	See 4.3.3	$Z_{\Theta JX}$		40	°C/W
1N6857-1, UR-1						
Forward voltage	4011	I_F = 1 mA dc	V_{F1}		0.350	V dc
Forward voltage	4011	I_F = 35 mA dc	V_{F2}		0.75	V dc
Reverse current	4016	DC method; V_R = 16 Vdc	I_{R1}		150	nA dc
Breakdown voltage	4021	I_R = 10 μA dc	$V_{(BR)1}$	20		V dc
Thermal impedance	3101	See 4.3.3	$Z_{\Theta JX}$		40	°C/W
1N6858-1, UR-1						
Forward voltage	4011	I_F = 1 mA dc	V_{F1}		0.360	V dc
Forward voltage	4011	I_F = 15 mA dc	V_{F2}		0.65	V dc
Reverse current	4016	DC method; V_R = 50 Vdc	I_{R1}		200	nA dc
Breakdown voltage	4021	I_R = 10 μA dc	$V_{(BR)1}$	70		V dc
Thermal impedance	3101	See 4.3.3	$Z_{\Theta JX}$		40	°C/W
Subgroup 3						
1N5711-1, all packages						
High temperature operation		T_A = +150°C				
Reverse current	4016	DC method; V_R = 50 Vdc	I_{R2}		200	μA dc
Low temperature operation		T_A = -55°C				
Forward voltage	4011	I_F = 1 mA dc	V_{F3}		0.55	V dc
Forward voltage	4011	I_F = 15 mA dc	V_{F4}		1.0	V dc
Breakdown voltage	4021	I_R = 10 μA dc	$V_{(BR)2}$	70		V dc

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 3 – Continued.						
1N5712-1, all packages High temperature operation		T_A = +150°C				
Reverse current	4016	DC method; V_R = 16 V dc	I_{R2}		150	µA dc
Low temperature operation		T_A = -55°C				
Forward voltage	4011	I_F = 1 mA dc	V_{F3}		0.55	V dc
Forward voltage	4011	I_F = 35 mA dc	V_{F4}		1.0	V dc
Breakdown voltage	4021	I_R = 10 µA dc	$V_{(BR)2}$	20		V dc
1N6857-1, UR-1 High temperature operation						
Reverse current	4016	T_A = +150°C DC method; V_R = 16 V dc	I_{R2}		300	µA dc
Low temperature operation		T_A = -55°C				
Forward voltage	4011	I_F = 1 mA dc	V_{F3}		0.55	V dc
Forward voltage	4011	I_F = 35 mA dc	V_{F4}		1.0	V dc
Breakdown voltage	4021	I_R = 10 µA dc	$V_{(BR)2}$	20		V dc
1N6858-1, UR-1 High temperature operation		T_A = +150°C				
Reverse current	4016	DC method; V_R = 50 V dc	I_{R2}		400	µA dc
Low temperature operation		T_A = -55°C				
Forward voltage	4011	I_F = 1 mA dc	V_{F3}		0.55	V dc
Forward voltage	4011	I_F = 15 mA dc	V_{F4}		1.0	V dc
Breakdown voltage	4021	I_R = 10 µA dc	$V_{(BR)2}$	70		V dc
Subgroup 4						
Capacitance	4001	V_r = 0V dc; f = 1 MHz; V_{sig} = 50 mV(pk) maximum				
1N5711-1, 1N5712-1, and UB and UR			C		2.0	pF
1N6857-1, 1N6858-1, and UR					4.5	pF
Effective carrier lifetime (see 4.5.2) 2/		(See DESC drawing 68001)	τ_{CL}		100	ps
Subgroups 5, 6, and 7						
Not applicable						

1/ For sampling plan, see MIL-PRF-19500.
2/ Effective carrier lifetime needs to be performed only one time per wafer lot.

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

Inspection	MIL-STD-750		Qualification
	Method	Conditions	
Subgroup 1			22 devices c = 0
Thermal shock	1056	100 cycles, -55°C to 100°C	
Temperature cycling (air to air)	1051	500 cycles, -55°C to 150°C	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table I, subgroup 2 (V_{F1}, I_{R1} and thermal impedance)	
Subgroup 2			22 devices c = 0
Steady-state dc blocking life	1038	See 4.3.1, 1,000 hrs	
Electrical measurements		See table I, subgroup 2 (V_{F1} and I_{R1})	
Subgroup 3			3 devices c = 0
DPA (decap analysis)	2101	Cross section; scribe and break (glass diodes); separate samples to be used for each test.	
	2102	Delid (UB package).	
Subgroup 4			
Thermal impedance curves		Each supplier shall submit their (typical) maximum thermal impedance curves. In addition, the optimal test conditions and $Z_{\theta JX}$ limit shall be provided to the qualifying activity in the qualification report.	
Subgroup 5			
Not applicable			
Subgroup 6			3 devices c = 0
ESD testing	1020		
Subgroup 7			
Not applicable			
Subgroup 8			45 devices c = 0
Resistance to glass cracking	1057	Test until failure occurs or to a maximum of 25 cycles, whichever comes first.	

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

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 (QML19500) 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.

JANC ordering information	
PIN	Manufacturer
	43611
1N5711-1 1N5712-1 1N6857-1 1N6858-1	JANHCA1N5711, JANKCA1N5711 JANHCA1N5712, JANKCA1N5712 JANHCA1N6857, JANKCA1N6857 JANHCA1N6858, JANKCA1N6858

6.4 Suppliers of die. The qualified die suppliers with the applicable letter version (e.g., JANHCA1N5711) will be identified on the QML.

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
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

(Project 5961-2860)

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

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://www.dodssp.daps.mil/.