

The documentation and process conversion measures necessary to comply with this revision shall be completed by 8 December 2003.

INCH-POUND

MIL-PRF-19500/597D
8 September 2003
SUPERSEDING
MIL-PRF-19500/597C
3 July 1998

PERFORMANCE SPECIFICATION

* SEMICONDUCTOR DEVICE, TRANSISTORS, QUAD, FIELD EFFECT, N-CHANNEL, SILICON, TYPE 2N7334, JAN, JANTX, JANTXV, JANS, JANHC, JANKCA2N7334, AND JANHCA2N7334

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 quad N-channel, enhancement-mode, MOSFET, power transistor. Four levels of product assurance are provided for each hermetic encapsulated device type as specified in MIL-PRF-19500, with avalanche energy ratings (E_{AS} and E_{AR}) and maximum avalanche current (I_{AR}). Two levels of product assurance are provided for each unencapsulated device type die.

1.2 Physical dimensions. See figure 1 (MO-036AB dual-in line package), figure 2, and 6.4 for JANHC and JANKC die dimensions.

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

Type	P_T (1) $T_C = +25^\circ\text{C}$ (free air)	V_{GS}	I_{D1} (2) (3) $T_C = +25^\circ\text{C}$	I_{D2} (2) $T_C = +100^\circ\text{C}$	I_S
	<u>W</u>	<u>V dc</u>	<u>A dc</u>	<u>A dc</u>	<u>A dc</u>
2N7334	1.4	+20	1.0	0.6	1.0

E_{AS}	E_{AR}	I_{AR} (2)	I_{DM} (4)	T_{op} and T_{STG} $^\circ\text{C}$	Max $r_{DS(on)}$ (1)		$R_{\theta JA1}$ maximum (1 die) $^\circ\text{C/W}$	$R_{\theta JA2}$ Max (4 die) $^\circ\text{C/W}$
					$V_{GS} = 10 \text{ V dc}, I_D = I_{D2}$ $T_J = +25^\circ\text{C}$	$T_J = +150^\circ\text{C}$		
<u>mj</u>	<u>mj</u>	<u>A</u>	<u>A(pk)</u>	<u>^\circ C</u>	<u>ohm</u>	<u>ohm</u>	<u>^\circ C/W</u>	<u>^\circ C/W</u>
75	.14	1.0	4.0	-55 to +150	0.70	1.4	90	50

- (1) Derate linearly 11 mW/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.
- (2) The following formula derives the maximum theoretical I_D limit. I_D is limited by package and internal wires and may be limited by pin diameter:

$$I_D = \sqrt{\frac{T_{JM} - T_C}{(R_{\theta IC}) \times (R_{DS(on)} \text{ at } T_{JM})}}$$

- (3) See figure 3, maximum drain current graph.
- (4) $I_{DM} = 4 I_{D1}$; I_{D1} as calculated in footnote (2).

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, Post Office 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.

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FSC 5961

1.4 Primary electrical characteristics at $T_C = +25^\circ\text{C}$.

Type	Min $V_{(BR)DSS}$ $V_{GS} = 0\text{ V}$ $I_D = 1\text{ mA dc}$	$V_{GS(th)1}$ $V_{DS} \geq V_{GS}$ $I_D = 0.25\text{ mA}$	Max I_{DSS1} $V_{GS} = 0\text{ V}$	Max $r_{DS(on)1}$ (1) $V_{GS} = 10\text{ V dc}$ $I_D = I_{D2}$
			$V_{DS} = 80$ percent of rated V_{DS}	$T_J = +25^\circ\text{C}$
	<u>V dc</u>	<u>V dc</u> Min Max	<u>$\mu\text{A dc}$</u>	<u>ohms</u>
2N7334	100	2.0 4.0	25	0.70

(1) Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

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

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 thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

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

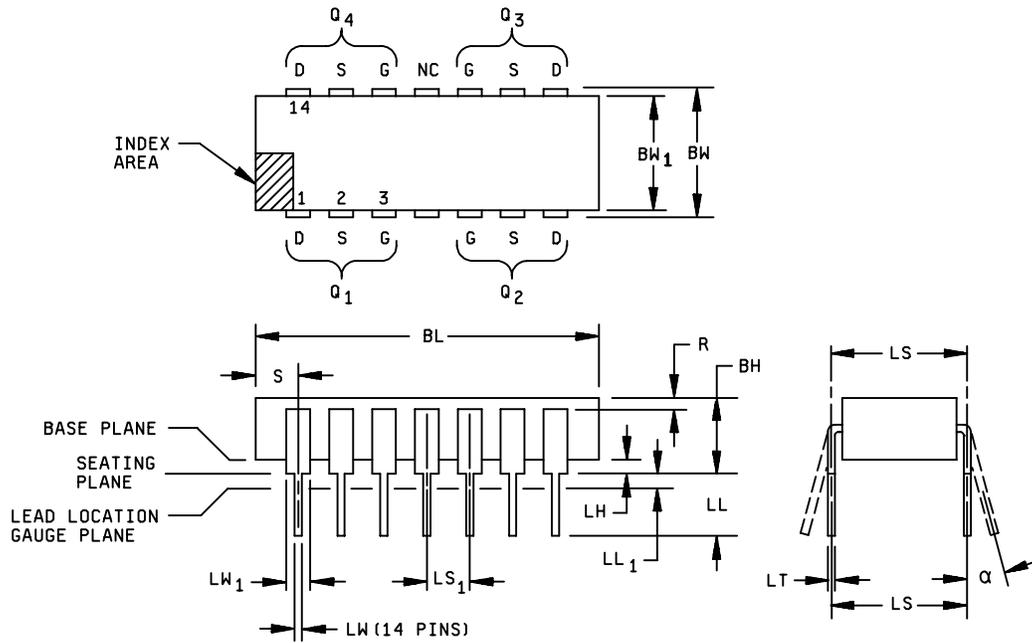
STANDARD

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 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	
BH	.105	.175	2.67	4.45	11
LH	.025	.055	0.64	1.40	9, 11
LW	.015	.021	0.381	0.533	9
LW ₁	.038	.060	0.97	1.52	
LT	.008	.012	0.203	0.305	
BL	.690	.770	17.53	19.56	
BW	.290	.325	7.37	8.26	
BW ₁	.280	.310	7.11	7.87	10

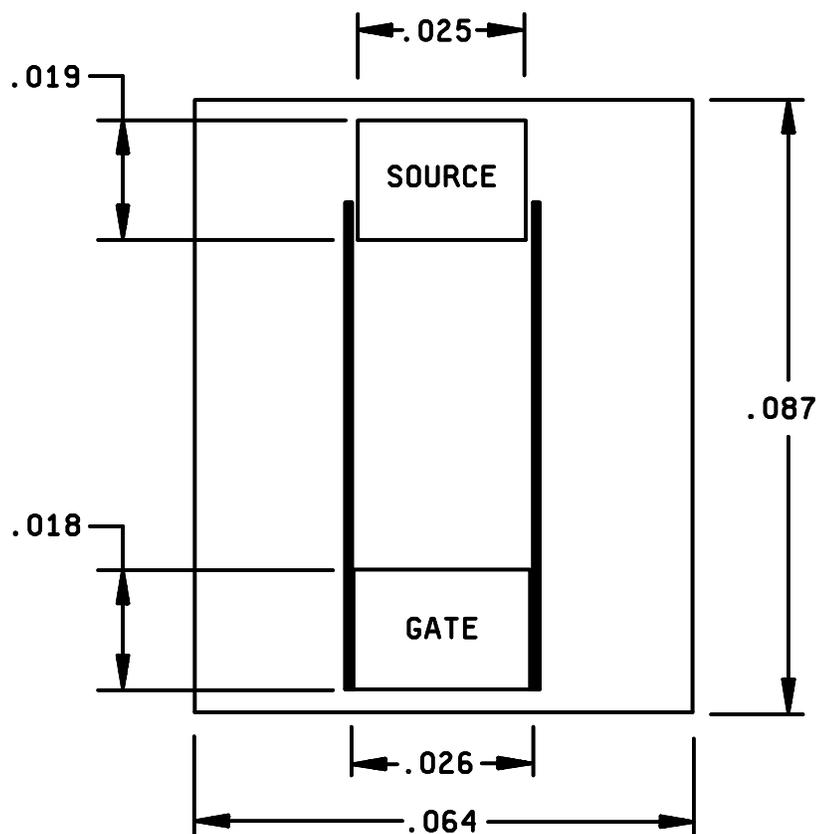
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
LS	.300 TP		7.62 TP		5, 6
LS ₁	.100 TP		2.54 TP		5, 6
LL	.125	.175	3.18	4.45	11
LL ₁	0	.030	0	0.76	6
alpha	0°	15°	0°	15°	7
R	.010		0.25		
S	.030	.095	0.76	2.41	
N	14		14		8

* FIGURE 1. Dimensions and configuration (MO-036AB).

NOTES:

1. Dimensions are in inches.
2. Millimeters are for general information only.
3. Refer to applicable symbol list.
4. Dimensioning and tolerancing in accordance with ASME Y14.5.
5. Leads within .005 inch (0.13 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.
6. LS_1 and LS applies in zone LL_1 when unit installed.
7. α applies to spread leads prior to installation.
8. N is the number of terminal positions.
9. Outlines on which the seating plane is coincident with the base plane ($LH = 0$), terminals lead standoffs are not required, and LH_1 may equal LW along any part of the lead above the seating/base plane.
10. BW_1 does not include particles of package materials.
11. This dimension shall be measured with the device seated in the seating plane gauge JEDEC Outline No. GS-3.

* FIGURE 1. Dimensions and configuration (MO-036AB) - Continued.



Inches	mm
.005	0.13
.018	0.46
.019	0.48
.025	0.64
.026	0.66
.064	1.63
.087	2.21
.0187	0.475

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .005$ inch (0.13 mm).
4. The physical characteristics of the die thickness are .0187 inch (0.475 mm). The back metal is chrome, nickel, silver (Cr, Ni, Ag). The top metal is aluminum and the back contact is the drain.
5. Dimensioning and tolerancing in accordance with ASME Y14.5.

* FIGURE 2. JANHCA and JANKCA die dimensions.

3. REQUIREMENTS

- * 3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.
- * 3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).
- * 3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.
- * 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500 and on figure 1 (MO-036AB) and figure 2 herein.
- * 3.4.1 Lead finish. Lead finish shall be solderable as defined in MIL-STD-750, MIL-PRF-19500, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).
- * 3.5 Marking. Marking shall be in accordance with MIL-PRF-19500.
- * 3.6 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection.
 - * 3.6.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of electrostatic charge. The following handling practices shall be followed:
 - a. Devices shall be handled on benches with conductive handling devices.
 - b. Ground test equipment, tools, and personnel handling devices.
 - c. Do not handle devices by the leads.
 - d. Store devices in conductive foam or carriers.
 - e. Avoid use of plastic, rubber, or silk in MOS areas.
 - f. Maintain relative humidity above 50 percent if practical.
 - g. Care shall be exercised, during test and troubleshooting, to apply not more than maximum rated voltage to any lead.
 - h. Gate must be terminated to source, $R \leq 100 \text{ k}$, whenever bias voltage is to be applied drain to source.
- * 3.7 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.
- * 3.8 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3 herein.
- * 3.9 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.

* 4.2.1 JANHC and JANKC devices. Qualification for JANHC and JANKC devices shall be as specified in MIL-PRF-19500.

* 4.2.2 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 associated specification that did not request the performance of table II tests, the tests specified in table II herein shall be performed by the first inspection lot of this revision to maintain qualification.

* 4.3 Screening (JANS, JANTX and JANTXV levels only). 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 appendix E, table IV of MIL-PRF-19500) (1) (2)	Measurement	
	JANS level	JANTX and JANTXV levels
(3)	Gate stress test (see 4.3.2)	Gate stress test (see 4.3.2).
(3) (4)	Method 3470 of MIL-STD-750, (see 4.3.3) optional	Method 3470 of MIL-STD-750, (see 4.3.3) optional
(3) 3c	Method 3161 of MIL-STD-750, (see 4.3.4)	Method 3161 of MIL-STD-750, (see 4.3.4)
9	I_{GSSF1} , I_{GSSR1} , I_{DSS1} , subgroup 2 of table I herein	Subgroup 2 of table I herein
10	Method 1042 of MIL-STD-750, test condition B	Method 1042 of MIL-STD-750, test condition B
11	I_{GSSF1} , I_{GSSR1} , I_{DSS1} , $r_{DS(on)1}$, $V_{GS(th)1}$ subgroup 2 of table I herein; $\Delta I_{GSSF1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 25$ μ A dc or ± 100 percent of initial value, whichever is greater.	I_{GSSF1} , I_{GSSR1} , I_{DSS1} , $r_{DS(on)1}$, $V_{GS(th)1}$ subgroup 2 of table I herein;
12	Method 1042 of MIL-STD-750, test condition A, $t = 240$ hours, or accelerated test, $T_A = +175^\circ\text{C}$, $t = 48$ hours	Method 1042 of MIL-STD-750, test condition A
13	Subgroups 2 and 3 of table I herein; $\Delta I_{GSSF1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 25$ μ A dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1} = \pm 20$ percent of initial value $\Delta V_{GS(th)1} = \pm 20$ percent of initial value	Subgroup 2 of table I herein; $\Delta I_{GSSF1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 25$ μ A dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1} = \pm 20$ percent of initial value $\Delta V_{GS(th)1} = \pm 20$ percent of initial value

- (1) At the end of the test program, I_{GSSF1} , I_{GSSR1} and I_{DSS1} are measured.
- (2) An out-of-family program to characterize I_{GSSF1} , I_{GSSR1} , I_{DSS1} and $V_{GS(th)1}$ shall be invoked.
- (3) Shall be performed anytime before screen 9.
- (4) This test method in no way implies a repetitive avalanche energy rating. This test need not be performed in group A when performed as a screen.

4.3.1 Screening (JANH and JANKC). Screening of shall be in accordance with appendix G of MIL-PRF-19500.

* 4.3.2 Gate stress test. Apply $V_{GS} = +30$ V minimum for $t = 250$ μ s minimum.

* 4.3.3 Single pulse avalanche energy E_{AS} .

- a. Peak current (I_{AS}) I_{D1} .
- b. Peak gate voltage (V_{GS})..... 10 V.
- c. Gate to source resistor (R_{GS})..... $25 \leq R_{GS} \leq 200\Omega$.
- d. Initial case temperature $+25^{\circ}\text{C} +10^{\circ}\text{C}, -5^{\circ}\text{C}$.
- e. Inductance..... $\frac{2E_{AS}}{(I_{D1})^2} \frac{(V_{BR} - V_{DD})}{V_{BR}}$ *mh minimum*
- f. Number of pulses to be applied 1 pulse minimum.
- g. Supply voltage (V_{DD}).....25 V min.

* 4.3.4 Thermal impedance ($Z_{\theta JC}$ measurements). The $Z_{\theta JC}$ measurements shall be performed in accordance with method 3161 of MIL-STD-750. The maximum limit (not to exceed the figure 4 thermal impedance curve) for $Z_{\theta JC}$ in screening (table IV of MIL-PRF-19500) and table I, subgroup 2 herein shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X bar R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for Engineering evaluation and disposition. This procedure may be used in lieu of an in-line process monitor.

- a. Measuring current (I_M) 10 mA.
- b. Drain heating current (I_H).....0.15 A minimum.
- c. Heating time (t_H) 100 ms.
- d. Drain-source heating voltage (V_H)..15 V minimum.
- e. Measurement time delay (t_{MD})30 to 60 μ s.
- f. t_{SW} sample window time 10 μ s (maximum).

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein. Alternate flow is allowed for conformance inspection in accordance with appendix E of MIL-PRF-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with appendix E, table V of MIL-PRF-19500, and table I herein. (End-point electrical measurements 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 appendix E, table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B3	1051	Condition G.
B5	1042	Condition A, $V_{DS} = 80$ percent of rated, $T_A = +175^\circ\text{C}$, $t = 120$ hours.
B5	1042	Condition B, $V_{GS} = 80$ percent of rated, gate stress $T_A = +175^\circ\text{C}$, $t = 24$ hours.
B6	3161	See 4.5.2.

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

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B2	1051	Condition G.
B3	1042	Condition A, $V_{DS} = 80$ percent of rated, $T_A = +150^\circ\text{C}$, $t = 160$ hours.
B3	1042	Condition B, $V_{GS} = 80$ percent of rated, $T_A = +150^\circ\text{C}$, $t = 24$ hours.
B5 and B6		Not applicable.

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

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

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
C2	2036	Test condition E: The sampling plan applies to the number of leads tested. A minimum of three devices shall be tested.
C5	3161	See 4.5.2.
C6	1042	Condition A, $V_{DS} = 80$ percent of rated, $T_A = +150^\circ\text{C}$, $t = 340$ hours. Electrical measurements in accordance with table I, subgroup 2 herein.
C6	1042	Condition B, $V_{DS} = 80$ percent of rated, $T_A = +150^\circ\text{C}$, $t = 24$ hours.

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

4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3161 of MIL-STD-750. $R_{\theta JA}$ maximum = 90°C/W, for each die.

- a. I_M measuring current 10 mA.
- b. I_H drain heating current..... 150 mA (minimum).
- c. t_H heating time Steady-state (see method 3161 of MIL-STD-750 for definition).
- d. V_H drain-source heating voltage..... 15 V.
- e. t_{MD} measurement time delay 30 to 60 μ s.
- f. t_{SW} sample window time 10 μ s maximum.

* TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance 2/	3161	See 4.3.4	$Z_{\theta JC}$		See 4.3.4	
Breakdown voltage, drain to source	3407	$V_{GS} = 0$ V dc, $I_D = 1$ mA dc, condition C	$V_{(BR)DSS}$	100		V dc
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, $I_D = 0.25$ mA dc	$V_{GS(th)1}$	2.0	4.0	V dc
Gate current	3411	$V_{GS} = +20$ V dc, bias condition C, $V_{DS} = 0$	I_{GSS1}		+100	nA dc
Gate current	3411	$V_{GS} = -20$ V dc, bias condition C, $V_{DS} = 0$	I_{GSS1}		-100	nA dc
Drain current	3413	$V_{GS} = 0$ V dc, $V_{DS} = 80$ percent of rated V_{DS} , bias condition C	I_{DSS1}		25	μ A dc
Static drain to source on-state resistance	3421	$V_{GS} = 10$ V dc, pulsed (see 4.5.1), condition A, $I_D =$ rated I_{D2} (see 1.3)	$r_{DS(on)1}$		0.70	Ω
		$I_D = I_{D1}$, (see 1.3)	$r_{DS(on)2}$		0.80	Ω
Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1), $V_{GS} = 0$ V, $I_D = I_{D1}$	V_{SD}		1.5	V
<u>Subgroup 3</u>						
High temperature operation:		$T_C = T_J = +125^\circ\text{C}$				
Gate current	3411	Bias condition C, $V_{GS} = +20$ V dc and -20 V dc, $V_{DS} = 0$ V dc	I_{GSS2}		± 200	nA dc
Drain current	3413	Bias condition C, $V_{GS} = 0$ V dc, $V_{DS} = 80$ percent of rated V_{DS}	I_{DSS2}		0.25	mA dc

See footnotes at end table.

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 3</u> - Continued						
Static drain to source on-state resistance	3421	$V_{GS} = 10 \text{ V dc}$, pulsed (see 4.5.1), $I_D = \text{rated } I_{D2}$	$r_{DS(on)3}$		1.4	Ω
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, $I_D = 0.25 \text{ mA dc}$	$V_{GS(th)2}$	1.0		V dc
Low temperature operation:		$T_C = T_J = -55^\circ\text{C}$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, $I_D = 0.25 \text{ mA dc}$	$V_{GS(th)3}$		5.0	V dc
<u>Subgroup 4</u>						
Switching time test	3472	$I_D = \text{rated } I_{D1}$, $V_{GS} = 10 \text{ V dc}$, $R_g = 7.5\Omega$, $V_{DD} = 0.5 V_{BR(DSS)}$				
Turn-on delay time			$t_{d(on)}$		20	ns
Rise time			t_r		25	ns
Turn-off delay time			$t_{d(off)}$		40	ns
Fall time			t_f		40	ns
<u>Subgroup 5</u>						
Single pulse avalanche energy	3470	See 4.3.3	E_{AS}			
Electrical measurements		Table I, subgroup 2 herein.				
Safe operating area test	3474	$V_{DS} = 80 \text{ percent of rated } V_{BR(DSS)}$, $t_p = 10 \text{ ms}$, $I_D = .25 \text{ A}$, see figure 5				
Electrical measurements		Table I, subgroup 2 herein.				

See footnotes at end table.

* TABLE I. Group A inspection - Continued.

Inspection 1/ Subgroup 6 Not applicable Subgroup 7	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Gate charge	3471	Condition B				
On-state gate charge			$Q_{g(on)}$		15	nC
Gate to source charge			Q_{gs}		7.5	nC
Gate to drain charge			Q_{gd}		7.5	nC
Reverse recovery time	3473	$di/dt = 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq 30 \text{ V}$ dc; $I_D = I_{D1}$	t_r		200	ns

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

2/ This test is required for the following end-point measurement only (not intended for screen 9, 11, or 13): JANS, table VIa of MIL-PRF-19500, group B, subgroup 3; JAN, JANTX, and JANTXV, table VIb of MIL-PRF-19500, group B, subgroup 2; and table VII of MIL-PRF-19500, group C, subgroup 2, and table IX of MIL-PRF-19500, group E, subgroup 1.

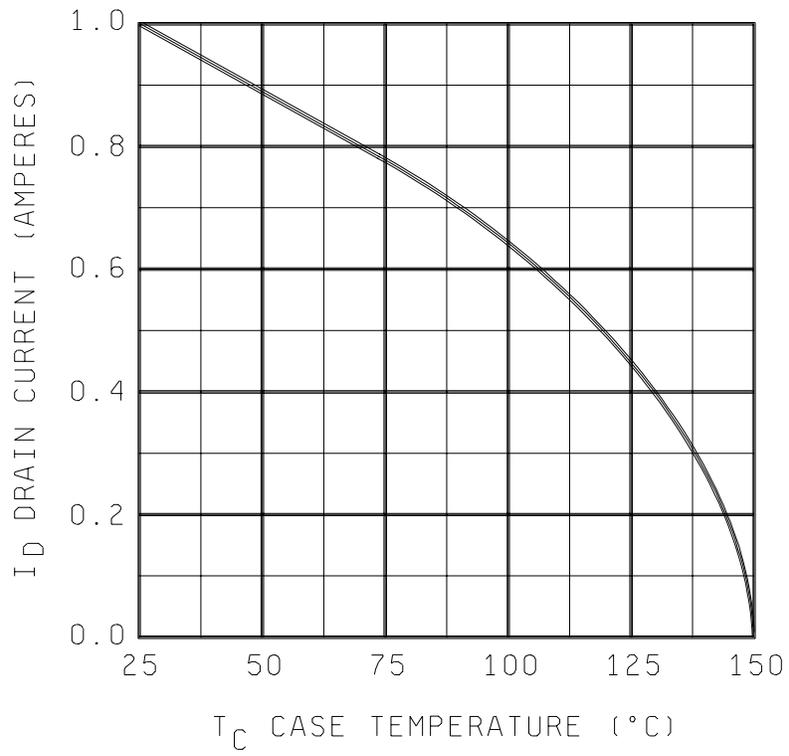
MIL-PRF-19500/597D

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

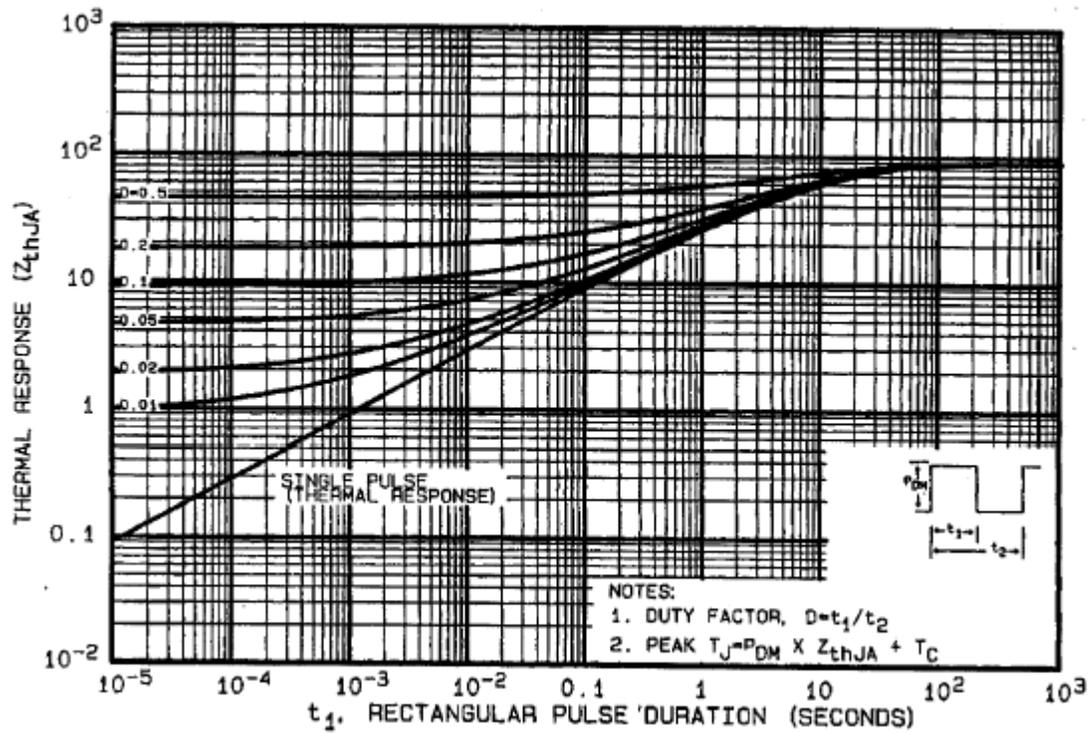
Inspection 1/	MIL-STD-750		Qualification and large lot quality conformance inspection 1/
	Method	Conditions	
<u>Subgroup 1</u>			22 devices c = 0
Temperature cycle	1051		
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See table I, subgroup 2	
<u>Subgroup 2 2/</u>			22 devices c = 0
Steady-state reverse bias	1042	Condition A, 1,000 hours	
Electrical measurements		See table I, subgroup 2	
Steady-state gate bias	1042	Condition B, 1,000 hours	
Electrical measurements		See table I, subgroup 2	
<u>Subgroup 3</u>			3 devices, c = 0
DPA	2102		
<u>Subgroup 4</u>			sample size N/A
Thermal resistance, thermal impedance curves		Each supplier shall submit their (typical) design thermal impedance curves. In addition, test conditions and $Z_{\theta JX}$ limit shall be provided to the qualifying activity in the qualification report	
<u>Subgroup 5</u>			
Not applicable			
<u>Subgroup 6</u>			3 devices
ESD	1020		
<u>Subgroup 7</u>			
Commutating diode for safe operating area test procedure for measuring dv/dt during reverse recovery of power MOSFET transistors or insulated gate bipolar transistors	3476		22 devices c = 0

1/ JANHC and JANKC devices are qualified in accordance with appendix G of MIL-PRF-19500.

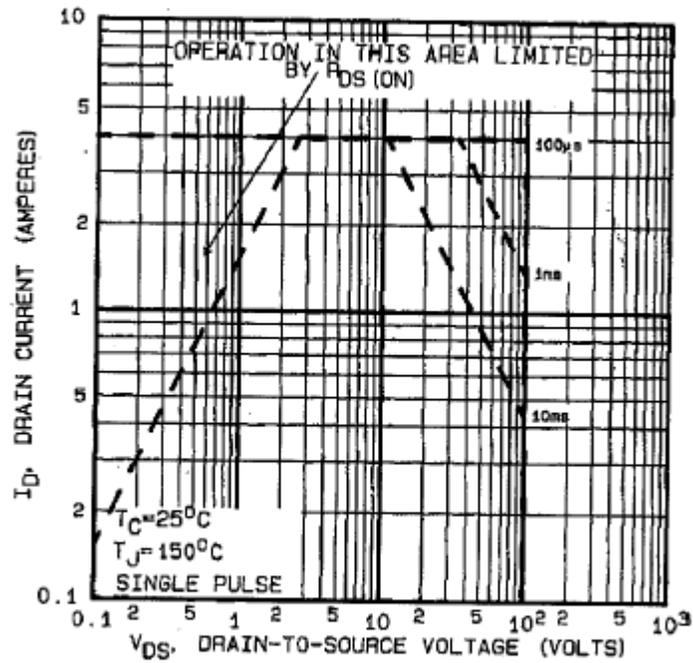
2/ A separate sample for each test may be pulled.



* FIGURE 3. Maximum drain current vs case temperature.



* FIGURE 4. Thermal response curves.



* FIGURE 5. Safe operating area.

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:

- 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 2.2.1).
- c. Packaging requirements (see 5.1).
- d. Lead finish (see 3.4.1).
- e. Type designation and quality assurance level.

* 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.

* 6.4 Suppliers of JANHC and JANKC. The qualified JANHC and JANKC die suppliers with the applicable letter version (example JANHCA2N7334) will be identified on the QML.

JANHC and JANKC ordering information	
PIN	Manufacturer's CAGE code
	59993
2N7334 2N7334	JANHCA2N7334 JANKCA2N7334

6.5 Substitution information. Devices covered by this specification are substitutable for the manufacturers' and users' PIN. This information in no way implies that manufacturers' part or identifying numbers are suitable as a substitute for the military PIN's.

Military PIN	Manufacturer's CAGE code	Manufacturer's and user's PIN
2N7334	59993	IRFG110

* 6.6 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - CR
 Navy - EC
 Air Force - 11
 NASA - NA
 DLA - CC

Preparing activity:

DLA - CC

(Project 5961-2755)

Review activities:

Army - MI, SM
 Navy - MC
 Air Force - 19, 99

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.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE
	MIL-PRF-19500/597D	8 September 2003

3. **DOCUMENT TITLE** SEMICONDUCTOR DEVICE, TRANSISTORS, QUAD, FIELD EFFECT, N-CHANNEL, SILICON, TYPE 2N7334, JAN, JANTX, JANTXV, JANS, JANHC, JANKCA2N7334, AND JANHCA2N7334

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
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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@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
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