The documentation and process conversion measures necessary to comply with this revision shall be completed by 6 November 2004.

INCH-POUND

MIL-PRF-19500/607B
6 August 2004
SUPERSEDING
MIL-PRF-19500/607A
11 February 1998

PERFORMANCE SPECIFICATION SHEET

* SEMICONDUCTOR DEVICE, FIELD EFFECT TRANSISTORS, N-CHANNEL AND P-CHANNEL, SILICON, TYPE 2N7337
JAN, JANTX, JANTXV, JANS, AND JANHC

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

1.2 Physical dimensions. See figure 1 (MO-036AB) (14 pin dip), and figure 2 for JANC die dimensions.

1.3 Maximum ratings. Unless otherwise specified, T_A = +25°C.

Type	P_T (1) T_C = +25°C	V_{GS}	I_{D1} (2) (3) T_C = +25°C		I_{D2} (2) T_C = +100°C		I_S		Min $V_{(BR)DSS}$	
									V_{GS} = 0 V I_D = 1.0 mA	V_{GS} = 0 V I_D = -1.0 mA
	W	V dc	A dc		A dc		A dc		V dc	
			N-channel	P-channel	N-channel	P-channel	N-channel	P-channel	N-channel	P-channel
2N7337	1.4	± 20	1.0	1.0	0.6	0.6	1.0	1.0	100	100

See notes at end of paragraph.

* 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://www.dodssp.daps.mil/

* 1.3 Maximum ratings. Unless otherwise specified, T_A = +25°C. Continued.

E_{AS}	E_{AR}	I_{AR}		I_{DM} (4)		T_J and T_{STG}	Max $R_{DS(ON)}$ (1) V_{GS} = 10 V dc, $I_D = I_{D2}$				$R_{\theta JA1}$	$R_{\theta JA2}$
							ohms		ohms			
mJ	mJ	A		A(pk)		°C	T_J = +25°C		T_J = +150°C		°C/W	°C/W
		N-CH	P-CH	N-CH	P-CH		N-CH	P-CH	N-CH	P-CH		
75	.14	1.0	1.0	4.0	4.0	-55 to +150	0.7	0.7	1.4	1.4	90	50

(1) Derate linearly 11.2 mW/°C for T_A > +25°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:

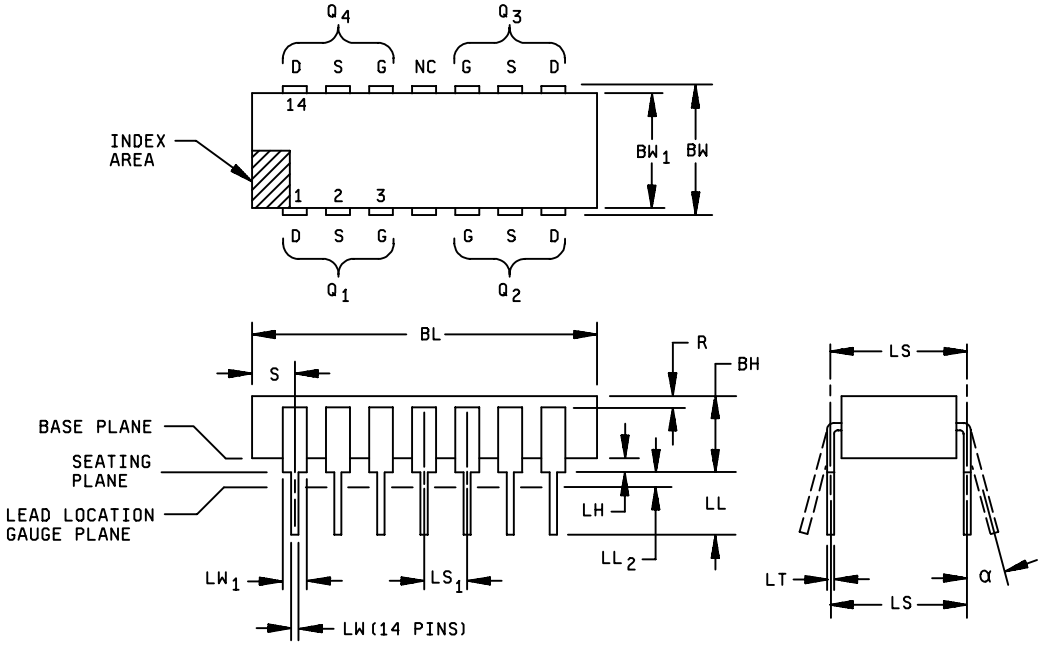
$$I_D = \sqrt{\frac{T_{JM} - T_C}{(R_{\theta JC}) \times (R_{DS}(on) \text{ at } T_{JM})}}$$

(3) See figure 3, maximum drain current graphs.

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

	Min $V_{(BR)DSS}$		$V_{GS(th)1}$		Max I_{DSS1}		Max $R_{DS(on)1}$ (1)	
	N-channel	P-channel	N-channel	P-channel	N-channel	P-channel	N-channel	P-channel
Type 2N7337	V_{GS} = 0 V I_D = 1.0 mA	V_{GS} = 0 V I_D = -1.0 mA	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA	$V_{DS} \geq V_{GS}$ I_D = -0.25 mA	V_{DS} = 80 percent of rated V_{DS}		V_{GS} = 10 V $I_D = I_{D2}$	V_{GS} = -10 V $I_D = I_{D2}$
	V dc		V dc		μA dc		ohms	
	100	-100	min max 2.0 4.0	min max -2.0 -4.0	25	-25	0.7	0.7

(1) Pulsed (see 4.5.1).

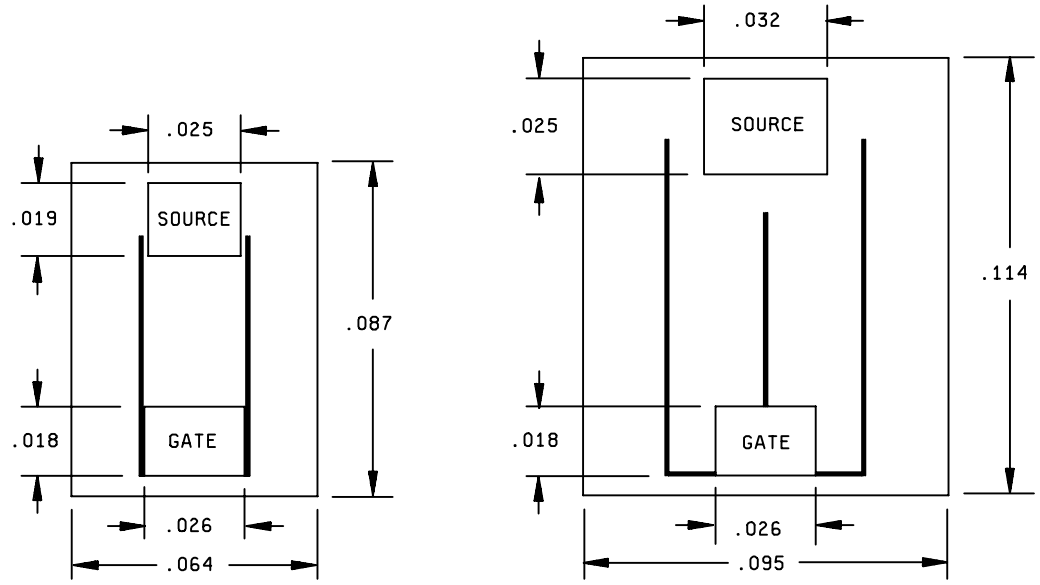


Symbol	Dimension			
	Inches		Millimeters	
	Min	Max	Min	Max
BH	.105	.165	2.67	4.19
LH	.025	.050	0.64	1.27
LW	.015	.021	0.381	0.533
LW_1	.042	.058	1.07	1.47
LT	.008	.012	0.203	0.305
BL	.735	.760	18.67	19.30
BW	.295	.322	7.49	8.18
BW_1	.280	.305	7.11	7.75

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
LS	.290	.315	7.37	8.00
LS_1	.095	.105	2.41	2.67
LL	.125	.175	3.18	4.45
LL_1	.000	.030	0.00	0.76
α	0°	15°	0°	15°
R	.010	- - -	0.25	- - -
S	.030	.095	0.76	2.41

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

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



Inches	mm
.018	0.46
.019	0.48
.025	0.64
.026	0.67
.032	0.82
.064	1.63
.087	2.21
.095	2.41
.114	2.90

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is $\pm$ .005 (0.13 mm).
4. The physical characteristics of the die thickness are .0187 (0.474 mm). The metals are chromium, nickel, and silver. The top metal is aluminum and the back contact is the drain.

* 5. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 2. JANHCA die dimensions.

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.)

* 2.3 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.

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 authorized by the qualifying activity for listing on the applicable qualified products 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.

I_{AS} .....Rated avalanche current, non-repetitive.
nC .....nano coulomb.

* 3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500 and on figure 1 (MO-036AB) 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 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection.

3.5.1 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, $R \leq 100$ kΩ, whenever bias voltage is to be applied drain to source.

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

* 3.7 Electrical test requirements. The electrical test requirements shall be as specified in table I.

* 3.8 Marking. Marking shall be in accordance with MIL-PRF-19500.

* 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 and tables I and II).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

* 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 request 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, 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 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 ΔI_{GSSF1} = +20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{GSSR1} = -20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{DSS1} = ± 25 μA 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	Method 1042 of MIL-STD-750, test condition A; optional t = 48 hours at +175°C (5)
13	Subgroups 2 and 3 of table I herein ΔI_{GSSF1} = +20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{GSSR1} = -20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{DSS1} = ± 25 μA dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1}$ = ± 20 percent of initial value $\Delta V_{GS(th)1}$ = + 20 percent of initial value	Subgroup 2 of table I herein ΔI_{GSSF1} = +20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{GSSR1} = -20 nA dc or ± 100 percent of initial value, whichever is greater. ΔI_{DSS1} = ± 25 μA dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1}$ = ± 20 percent of initial value $\Delta V_{GS(th)1}$ = + 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 need not be performed in table I when performed as a screen.
(5) Use of this accelerated screening option requires a 1,000 hour life test in accordance with the applicable group E, subgroup 2 life test, and end-points specified herein to be provided to the qualifying activity for review and acceptance.

* 4.3.1 Screening (JANC). Screening shall be in accordance with table IV ofMIL-PRF-19500.

* 4.3.2 Gate stress test. Apply V_{GS} = 30 V minimum for t = 250 µs 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°C +10°C, -5°C

e. Inductance ..... $\left[\frac{2E_{AS}}{(I_{D1})^2}\right]$ $\left[\frac{(V_{BR} - V_{DD})}{V_{BR}}\right]$ mH minimum.

f. Number of pulses to be applied .....1 pulse minimum.

g. Supply voltage V_{DD} ..... 25 V (N-channel); -25 V (P-channel).

* 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 figure 4, thermal impedance curves) for $Z_{\theta JC}$ in screening (table IV of MIL-PRF-19500) and table I 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 inline process monitor.

a. I_M measuring current..... 10 mA.

b. I_H drain heating current..... 0.15 A minimum.

c. t_H heating time ..... 100 ms.

d. V_H drain-source heating voltage..... 15 V.

e. t_{MD} measurement time delay ..... 30 to 60 µs.

f. t_{SW} sample window time ..... 10 µs maximum.

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

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein. (End-point electrical measurements shall be in accordance with table I, subgroup 2.)

* 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.

	Subgroup	Method	Conditions
	B3	1051	Test condition G, 100 cycles.
*	B4	1042	Test condition D; 2,000 cycles. The heating cycle shall be 1 minute minimum.
*	B5	1027	Condition A: V_{DS} = rated, T_A = +175°C, t = 120 hours. Read and record $V_{BR(DSS)}$ (pre and post) at I_D = 1.0 mA (N-CH), I_D = -1.0 mA (P-CH). Read and record I_{DSS} (pre and post), in accordance with table I, subgroup 2. (NOTE: A separate sample may be pulled for each test)
	B5	1042	Condition B: V_{GS} = rated, T_A = +175°C, t = 24 hours. (NOTE: A separate sample may be pulled for each test)
	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.

Subgroup	Method	Conditions
B2	1051	Test condition G, 25 cycles.
B3	1027	Test condition A: V_{DS} = 80 percent of rated. T_A = +150°C, t = 160 hours. (NOTE: A separate sample may be pulled for each test)
B3	1042	Test condition B: V_{GS} = 80 percent of rated. T_A = +150°C, t = 24 hours. (NOTE: A separate sample may be pulled for each test)
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.

	Subgroup	Method	Conditions
	C2	1056	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	1026	Test condition A: V_{DS} = 80 percent of rated. T_A = +150°C, t = 340 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, subgroup2 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..... 0.15 A 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 μs.

f. t_{SW} sample window time ..... 10 μs maximum.

* TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Units
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Thermal response 2/	3161	See 4.3.4	$Z_{\theta JC}$			
Breakdown voltage, drain to source	3407	Bias condition C V_{GS} = 0 V	$V_{(BR)DSS}$			
N-channel		I_D = 1.0 mA dc		100		V dc
P-channel		I_D = -1.0 mA dc		-100		V dc
Gate to source voltage (threshold)	3403	$V_{DG} \geq V_{GS}$	$V_{GS(th)1}$			
N-channel		I_D = 0.25 mA dc		2.0	4.0	V dc
P-channel		I_D = -0.25 mA dc		-2.0	4.0	V dc
Gate current	3411	Bias condition C, V_{GS} = +20 V dc, V_{DS} = 0	I_{GSSF1}		+100	nA dc
Gate current	3411	Bias condition C, V_{GS} = -20 V dc, V_{DS} = 0	I_{GSSR1}		-100	nA dc
Drain current	3413	Bias condition C, V_{GS} = 0 V dc, V_{DS} = 80 percent of rated V_{DS}	I_{DSS1}			
N-channel					25	μA dc
P-channel					-25	μA dc
Static drain to source on-state resistance	3421	Bias condition A, I_D = rated I_{D2} (see 1.3)	$r_{DS(ON)1}$			
N-channel		V_{GS} = 10 V			0.7	Ω
P-channel		V_{GS} = -10 V			0.7	Ω
Forward voltage	4011	Pulsed (see 4.5.1), Id = Id1 V_{GS} = 0 V dc	V_{SD}		1.8	V dc
N-channel					25	μA dc
P-channel					-25	μA dc

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Units
	Method	Conditions		Min	Max	
Subgroup 3						
High temperature operation:		$T_C = T_J = +125°C$				
Gate current	3411	V_{GS} = +20 V dc and -20 V dc, bias condition C, V_{DS} = 0	I_{GSS2}		± 200	nA dc
Drain current	3413	Bias condition C, V_{GS} = 0 V				
N-channel		V_{GS} = 80 percent of rated V_{DS}	I_{DSS2}		1.0	mA dc
		V_{DS} = 100 percent of rated V_{DS}	I_{DSS3}		0.25	mA dc
P-channel		V_{GS} = 80 percent of rated V_{DS}	I_{DSS2}		-1.0	mA dc
		V_{DS} = 100 percent of rated V_{DS}	I_{DSS3}		-0.25	mA dc
Static drain to source on-state resistance	3421	Pulsed (see 4.5.1), $I_D = I_{D2}$	$r_{DS(on)3}$			
N-channel		V_{GS} = 10 V			1.4	Ω
P-channel		V_{GS} = -10 V			1.4	Ω
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$,	$V_{GS(th)2}$			
N-channel		I_D = 0.25 mA dc		1.0		V dc
P-channel		I_D = -0.25 mA dc		-1.0		V dc
Low temperature operation:		$T_C = T_J = -55°C$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$,	$V_{GS(th)3}$			
N-channel		I_D = 0.25 mA dc			5.0	V dc
P-channel		I_D = -0.25 mA dc			-5.0	V dc
Subgroup 4						
Switching time test	3472	$I_D = I_{D1}$, V_{GS} = 10 V dc, R_G = 24Ω(N-ch), R_G = 18Ω (P-ch), V_{DD} = 50 percent of rated $V_{(BR)DSS}$				
Turn-on delay time			$t_{d(on)}$			
N-channel		V_{GS} = 10 V			20	ns
P-channel		V_{GS} = -10 V			30	ns
Rise time			t_r			
N-channel		V_{GS} = 10 V			25	ns
P-channel		V_{GS} = -10 V			60	ns

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Units
	Method	Conditions		Min	Max	
Subgroup 4 - Continued						
Turn-off delay time			$t_{d(off)}$			
N-channel		V_{GS} = 10 V			40	ns
P-channel		V_{GS} = -10 V			60	ns
Fall time			t_f			
N-channel		V_{GS} = 10 V			40	ns
P-channel		V_{GS} = -10 V			60	ns
Subgroup 5						
Single pulse avalanche energy	3470	See 4.3.3	E_{AS}			
Electrical measurements		See table I, subgroup 2				
Safe operating area test		See figure 5, V_{DS} = 80 percent of rated $V_{(BR)DSS}$, t_p = 10 ms				
N-channel		I_D = 0.25 A				
P-channel		I_D = -0.25 A				
Electrical measurements		See table I, subgroup 2				
Subgroup 6						
Not applicable						
Subgroup 7						
Gate charge	3471	Condition B				
On-state gate charge		V_{DD} = 0.5 BV_{DSS}, $I_D = I_{D1}$ $V_{GS} \leq$ 20V, $I_{GS1} = I_{GS2}$	$Q_{g(on)}$			
N-channel					15	nC
P-channel					22	nC
Gate to source charge			Q_{gs}			
N-channel					7.5	nC
P-channel					8.0	nC

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

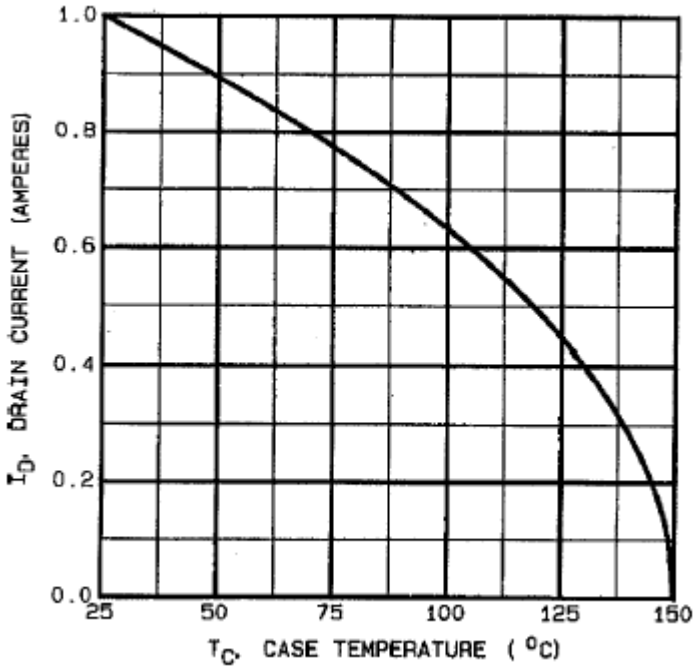
Inspection 1/	MIL-STD-750		Symbol	Limits		Units
	Method	Conditions		Min	Max	
Subgroup 7 - Continued						
Gate to drain charge			Q_{gd}			
N-channel					7.5	nC
P-channel					14.0	nC
Reverse recovery time	3473	di/dt = 100 A/μs, I_d = rated I_{d1}	T_{rr}			
N-channel		$V_{DD} \leq 30$ V			200	ns
P-channel		$V_{DD} \leq -30$ V			200	ns

1/ For sampling plan, see MIL-PRF-19500.
2/ This test is not intended for screen 9, 11, or 13.

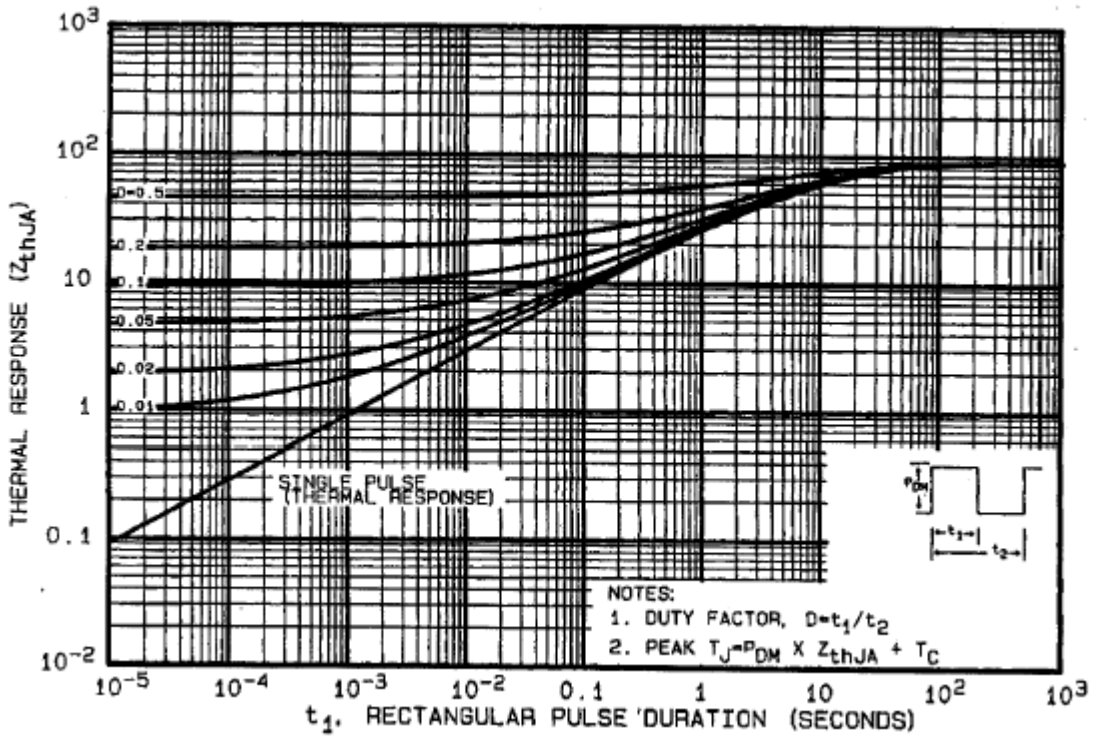
* TABLE II. Group E inspection (all quality levels) for qualification or re-qualification only.

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method	Conditions	
Subgroup 1			12 devices c = 0
Temperature cycling	1051	-55°C to +150°C, 500 cycles	
Hermetic seal	1071		
Fine leak Gross leak		Test conditions G or H Test conditions C or D	
Electrical measurements		See table I, subgroup 2	
Subgroup 2 1/			12 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	
Subgroup 3			3 devices c = 0
DPA	2102		
Subgroup 4			Sample size N/A
Thermal impedance curves		Each supplier shall submit their (typical) maximum design 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			15 devices c = 0
Not applicable			
Subgroup 6			3 devices
ESD	1020		
Subgroup 8			22 devices c = 0
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		

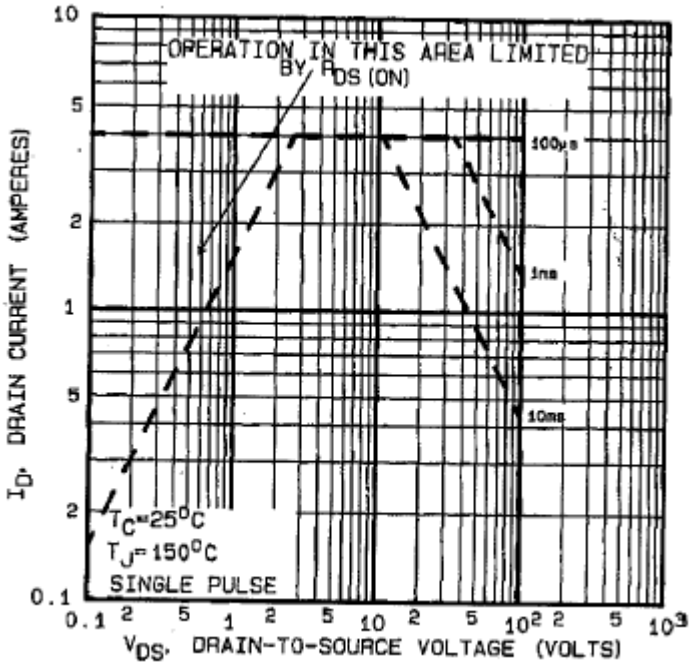
1/ A separate sample for each test shall be pulled.



* FIGURE 3. Maximum drain current vs case temperature graph.



* 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 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. Type designation and product 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 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 43218-3990 or e-mail vqe.chief@dla.mil.

6.4 Substitution information. Devices covered by this specification are substitutable for the manufacturers' and users' Part or Identifying Number (PIN). This information in no way implies that manufacturers' PIN's are suitable as a substitute for the military PIN.

Military PIN	Manufacturer's CAGE code	Manufacturer's and user's PIN
2N7337	59993	IRFG5110

* 6.5 Suppliers of JANHC and JANKC die. The qualified die suppliers with the applicable letter version (example JANHCA2N7236) will be identified on the QML.

JANC ordering information	
Military PIN	Manufacturer
	59993
2N7337	JANHCA2N7236

* 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

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

Preparing activity:
DLA - CC

(Project 5961-2846)

* 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/ .