The documentation and process conversion measures necessary to comply with this revision shall be completed by 30 July 1993.

INCH-POUND

MIL-S-19500/570A
31 March 1993
SUPERSEDING
MIL-S-19500/570
10 September 1987

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, FIELD EFFECT TRANSISTOR, N-CHANNEL, SILICON LOGIC-LEVEL, TYPES 2N6901, AND 2N6903 JANTX, JANTXV, AND JANS

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 detail requirements for a logic-level N-Channel, enhancement-mode, MOSFET, power transistor intended for use in high density power switching applications. Three levels of product assurance are provided for each device type as specified in MIL-S-19500.

1.2 Physical dimensions. See figure 1. TO-205AF (formerly TO39).

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

Type	P_T 1/ T_C = +25°C	P_T T_A = +25°C	V_{DS}	V_{DG}	V_{GS}	I_{D1} 2/ T_C = +25°C	I_{D2} T_C = +100°C	I_S 2/	I_{DM}	T_{OP} and T_{STG}	$R_{\theta JC}$ maximum
	W	W	V dc	V dc	V dc	A dc	A dc	A dc	A(pk)	°C	°C/W
2N6901	8.33	.6	100	100	±10	1.69	1.07	1.69	5	-55 to	15.0
2N6903	8.33	.6	200	200	±10	.98	0.62	.98	4	+150	15.0

1/ Derate linearly T_C > +25°C - (0.067 W/°C)

2/ Derate above T_C = +25°C according to the formula $I_D = \frac{P(rated)}{K}$,

where P(rated) = P_T-(T_C - 25) (W/°C) watts; K = Max $r_{DS(on)}$ at T_J = +150°C.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Research Laboratory, ATTN: AM SRL-EP-RD, Fort Monmouth, NJ 07703-5601, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5961

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1.4 Primary electrical characteristics. Unless otherwise specified, at T_C = +25°C.

Type	Min $V_{(BR)DSS}$ V_{GS} = 0 V I_D = 1 mA	$V_{GS(th)}$ $V_{DS} \geq V_{GS}$ I_D = 1 mA	Max I_{DSS1} V_{GS} = 0 V V_{DS} = 80% of rated V_{DS}	Max $r_{DS(on)}$ 1/ V_{GS} = 5 V dc	
				T_J = +25°C at I_{D1}	T_J = +150°C at I_D2
	V dc	V dc Min	Max	μA dc	Ohms	Ohms
2N6901	100	1.0	2.0	1.0	1.4	2.9
2N6903	200	1.0	2.0		3.65	8.65

1/ Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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

MILITARY

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

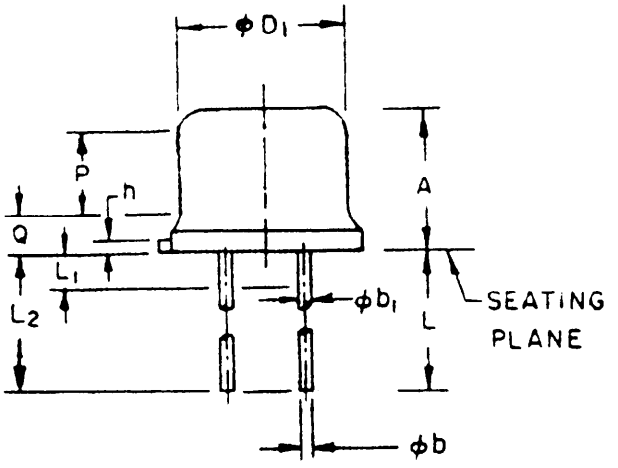
STANDARD

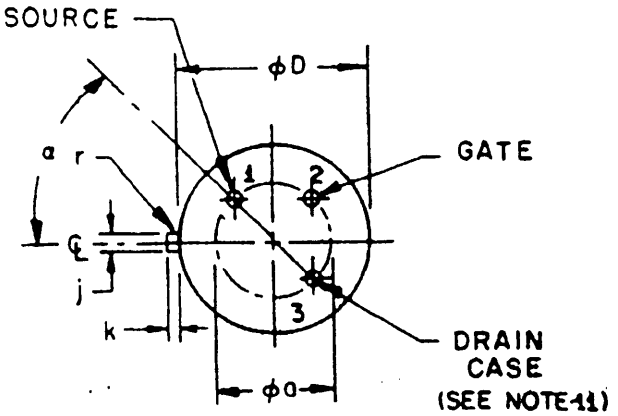
MILITARY

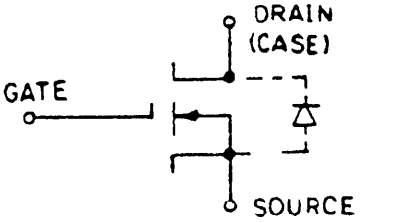
MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.







SCHEMATIC CIRCUIT

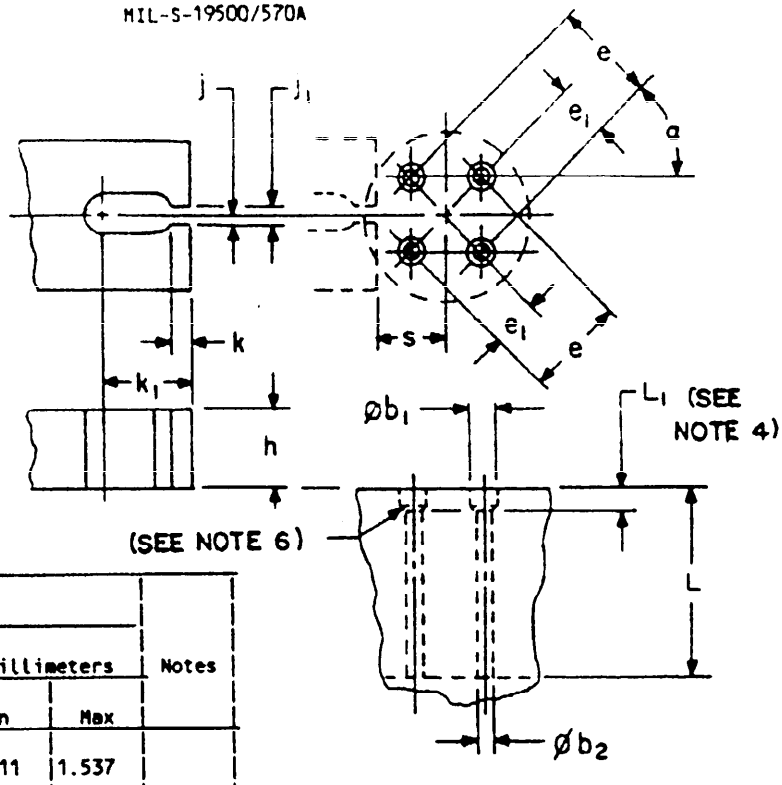
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.160	.180	4.07	4.57	
ϕa	.200 TP		5.08 TP		7
ϕb	.016	.021	0.41	0.63	8,9
ϕb_1	.016	.019	0.41	0.48	8,9
ϕD	.335	.370	8.51	9.40	
ϕD_1	.305	.335	7.75	8.51	
h	.009	.041	0.23	1.04	
j	.028	.034	0.71	0.86	3
k	.029	.045	0.74	1.14	4
L	.500	.750	12.70	19.05	8,9
L_1	---	.050	---	1.27	8,9
L_2	.250	---	6.35	---	8,9
P	.100	---	2.54	---	6
Q	---	.050	---	1.27	5
r	---	.010	---	0.25	10
α	45 TP		45 TP		6

FIGURE 1. Physical dimensions for TO-205 AF.

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Beyond radius(r) maximum, j shall be held for a minimum length of .011 (0.028 mm).
4. Dimension k measured from maximum ϕD.
5. Outline in this zone is not controlled.
6. Dimension ϕD_1 shall not vary more than .010 (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001, -.000 (1.37 +0.03, -0.00 mm) below seating plane shall be within .007 (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure shown on figure 2.
8. ϕb_1 applies between L_1 and L_2. ϕb applies between L_2 and L minimum. Diameter is uncontrolled in L_1 and beyond L minimum.
9. All three leads.
10. Radius(r) applies to both inside corners of tab.
11. Drain is electrically connected to the case.

FIGURE 1. Physical dimensions for TO-205 AF - Continued.



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
$øb_1$	.0595	.0605	1.511	1.537	
$øb_2$	.0325	.0335	0.826	0.851	
e	.1995	.2005	5.067	5.093	
e_1	.0995	.1005	2.527	2.553	
h	.150 Nominal		3.81 Nominal		
j	.0175	.0180	0.444	0.457	
j_1	.0350	.0355	0.889	0.902	
k	.009	.011	0.23	0.28	
k_1	.125 Nominal		3.18 Nominal		
L	.372	.378	9.45	9.60	
L_1	.054	.055	1.37	1.40	5
s	.182	.199	4.62	5.05	3
α	44.90°	45.10°	44.90°	45.10°	

FIGURE 2. Gauge for lead and tab locations.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The location of the tab locator within the limits indicated will be determined by the tab and flange dimensions of the device being checked.
4. Gauging procedure. The device being measured shall be inserted until its seating plane is .125 ±.010 (3.18 ±0.25 mm) from the seating surface of the gauge. A force of 8 ounces ±0.5 shall then be applied parallel and symmetrical to the device's cylindrical axis. When seating plane of the device shall be seated against the gauge. The use of a pin straightener prior to insertion in the gauge is permissible.
5. Gauging plane.
6. Drill angle.

FIGURE 2. Gauge for lead and tab locations - Continued.

3. REQUIREMENTS

3.1 Associated detail specification. The individual item requirements shall be in accordance with MIL-S-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-S-19500.

$V_{(BR)DSS}$	-	Drain to source breakdown voltage, all other terminals short-circuited to source.
I_S	-	Source current through drain diode (forward biased V_{SD}).
$I_{(ISO)}$	-	Source pin to case isolation current.
C	-	Coulomb.
g_{FS}	-	DC forward transconductance.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, and figure 1 herein.

3.3.1 Lead material and finish. Lead material shall be Kovar, Alloy 52; a copper core is permitted. Lead finish shall be gold, tin, or solder. Lead finish shall be solderable as specified in MIL-S-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the contract the contract or purchase order (see 6.3).

3.3.2 Internal construction. Multiple chip construction shall not be permitted to meet the requirements of this specification.

3.4 Marking. Marking shall be in accordance with MIL-S-19500. At the option of the manufacturer, marking of the country of origin may be omitted from the body of the transistor, but shall be retained on the initial container.

3.5 Electrostatic discharge protection. The devices covered by this specification require electrostatic protection (see 6.3).

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500. Alternate flow is allowed for qualification inspection in accordance with figure 2 of MIL-S-19500.

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with MIL-S-19500 and table IV herein.

4.3 Screening (JANTX, JANTXV and JANS levels only). Screening shall be in accordance with MIL-S-19500 (table II), 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 II of MIL-S-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/ 2/	Method 3470, (see 4.5.4) optional	Method 3470, (see 4.5.4) optional
1/	Method 3161, (see 4.5.3)	method 3161, (see 4.5.3)
9	I_{GSS1}, I_{DSS1}, gate stress test (see 4.5.5) subgroup 2 of table I herein	Gate stress test see (4.5.5) subgroup 2 of table I 3/ herein
10	Method 1042, test condition B	Method 1042, test condition B
11	Subgroup 2 of table I herein; I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)1}$ ΔI_{GSS1} = ±20 Na dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±.2 µA dc or ±100% of initial value, whichever is greater	Subgroup 2 of table I herein I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)}$
12	Method 1042, test condition A, t = 240 hours	Method 1042, test condition A or t = 48 hours minimum at +175°C minimum
13	Subgroups 2 and 3 of table I herein; ΔI_{GSS1} = +20 nA dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±.2 µA dc or ±100% of initial value, whichever is greater $\Delta r_{DS(on)1}$ = ±20% of initial value $\Delta V_{GS(th)1}$ = ±20% of initial value	Subgroup 2 of table I herein; ΔI_{GSS1} = ±20 nA dc or ±100% of initial value, whichever is greater ΔI_{DSS1} = ±.2 µA dc or ±100% of initial value, whichever is greater $\Delta r_{DS(on)1}$ = ±20% of initial value $\Delta V_{GS(th)1}$ = ±20% of initial value

1/ Shall be performed anytime before screen 10.
2/ This test method in no way implies an avalanche energy rating. This is a stress test designed to ensure a rugged product. This test need not be performed in group A when performed as a screen.
3/ These tests shall be performed after methods 3470, 3161, and gate stress test and shall precede screen 10.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-S-19500. Alternate flow is allowed for quality conformance inspection in accordance with figure 2 of MIL-S-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-S-19500, and table I herein. (End-point electrical measurements shall be in accordance with the applicable steps of table III herein.)

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IVa (JANS) and table IVb (JANTX and JANTXV) of MIL-S-19500, and as follows. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table III herein.

4.4.2.1 Group B inspection, table IVa of MIL-S-19500.

a. Subgroup 3

Temperature cycling; method 1051; test condition F3, except T_{Low} = - 55°C.

Bond strength; method 2037; test condition A, all internal wires for each device shall be pulled separately .

b. Subgroup 4

Intermittent operation life; method 1042; condition D: 2,000 cycles. The heating cycle shall be 1 minute minimum.

c. Subgroup 5

Accelerated steady-state operation life; method 1042; condition A, V_{DS} = rated, T_A = +175°C, t = 120 hours. Read and record $V_{BR(DSS)}$ (pre and post) at 1 mA = I_D. Read and record I_{DSS} (pre and post), as specified in table III.

Accelerated steady-state gate stress; condition B, V_G = rated, T_A = +175°C, t = 24 hours.

Bond strength; method 3161; test condition A.

4.4.2.2 Group B inspection, table IVb of MIL-S-19500.

a. Subgroup 2

Temperature cycling; method 1051; test condition G.

b. Subgroup 3

Intermittent operation life; method 1042; condition D: 2,000 cycles. The heating cycle shall be 30 seconds minimum.

Bond strength (wire or clip bonded); method 2037; Test condition A, all internal bond wires for each device shall be pulled separtely.

c. Subgroup 6

High-temperature (nonoperating) life (LTPD); method 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 V of MIL-S-19500, and as follows. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table III herein.

4.4.3.1 Group C inspection table V of MIL-S-19500.

a. Subgroup 2

Terminal strength (lead fatigue); method 2036; test condition E.

b. Subgroup 6

Intermittent operation life; method 1042; condition D: 6,000 cycles. The heating cycle shall be 30 seconds minimum.

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 measurements 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. $R_{\theta JC}$(max) = 15°C/W.

a. I_H measuring current - - - - - - - - - - - - - - - - - - 10 mA.

b. I_H drain heating current - - - - - - - - - - - - - - - - .5 A.

c. t_H heating time - Steady state (see MIL-STD-750 method 3161 for definition)

d. V_H drain-source heating voltage - - - - - - - - - - - - - 12 V.

e. t_{MD} measurement time delay - - - - - - - - - - - - - - - 10 to 80 µs.

f. t_{SW} sample window time - - - - - - - - - - - - - - - - - 10 (max) µs.

4.5.3 Thermal response (ΔV_{SD} measurements). The ΔV_{SD} measurements shall be performed in accordance with method 3161 of MIL-STD-750. The ΔV_{SD} conditions (I_H and V_H) and maximum V_{SD} limit shall be derived by each vendor from the thermal response curves (see figure 3). The chosen ΔV_{SD} measurement and conditions for each device in the qualification lot shall be submitted in the qualification report. The chosen ΔV_{SD} shall be considered final after the manufacturer has had the opportunity to test five consecutive lots.

a. I_H measuring current - - - - - - - - - - - - - - - - - - 10 Ma.

b. I_H drain heating current - - - - - - - - - - - - - - - - .5 (min) A.

c. t_H heating time - 10 ms.

d. V_H drain-source heating voltage - - - - - - - - - - - - - 12 (min) V.

e. t_{MD} measurement time delay - - - - - - - - - - - - - - - 10 to 80 µs.

f. t_{SW} sample window time - - - - - - - - - - - - - - - - - 10 (max) µs.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Breakdown voltage drain to source	3407	I_D = 1.0 mA dc Bias condition C, V_{GS} = 0 V	$V_{(BR)DSS}$			
2N6901				100		V dc
2N6903				200		V dc
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ I_D = 1.0 mA dc	$V_{GS(th)1}$	1.0	2.0	V dc
Gate current	3411	V_{GS} = +10 V dc and -10 V dc Bias condition C, V_{DS} = 0 V	I_{GSS1}		±100	nA dc
Drain current	3413	Bias condition C, V_{GS} = 0 V	I_{DSS1}			
2N6901		V_{DS} = 80 V dc			1.0	µA dc
2N6903		V_{DS} = 160 V dc			1.0	µA dc
Static drain to source "on-state" resistance	3421	V_{GS} = 5 V dc Bias condition A Pulsed (see 4.5.1)	$r_{DS(on)1}$			
2N6901		I_D = 1.07 A dc			1.4	ohm
2N6903		I_D = 0.62 A dc			3.65	ohm
Drain to source "on-state" voltage	3405	V_{GS} = 5 V dc Bias condition A Pulsed (see 4.5.1)	$V_{DS(on)}$			
2N6901		I_D = 1.69 A dc			2.4	V
2N6903		I_D = 0.98 A dc			6.0	V
Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1) V_{GS} = 0 V	V_{SD}			
2N6901		I_S = 1.69 A dc		0.8	1.6	V
2N6903		I_S = .98 A dc		0.8	1.6	V
Forward transconductance	3475	I_D = rated I_{D2} (see 1.3) Pulsed (see 4.5.1)	g_{fs}			
2N6901				0.5	2.0	S
2N6903				0.5	2.0	S

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 3						
High temperature operation:		$T_C = T_J = +125°C$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ $I_D = 1.0$ mA dc	$V_{GS(th)2}$	0.5		V dc
Gate current	3411	$V_{GS} = +10$ V dc and -10 V dc; $V_{DS} = 0$; Bias condition C	I_{GSS2}		±200	nA dc
Drain current	3413	Bias condition C $V_{GS} = 0$ V	I_{DSS2}			
2N6901		$V_{DS} = 80$ V dc			50	µA dc
2N6903		$V_{DS} = 160$ V dc			50	µA dc
Static drain to source "on-state" resistance	3421	$V_{GS} = 5$ V dc Pulsed (see 4.5.1)	$r_{DS(on)2}$			
2N6901		$I_D = 1.07$ A dc			2.6	ohm
2N6903		$I_D = 0.62$ A dc			7.7	ohm
Low temperature operation:		$T_C = T_J = -55°C$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ $I_D = 1.0$ mA dc	$V_{GS(th)3}$		3.0	V dc
Subgroup 4						
Switching time test	3472	I_D = rated I_{D2} (see 1.3) $V_{GS} = 5$ V dc Gate drive impedance = 25Ω				
Turn-on delay time			$t_{d(on)}$			
2N6901		$V_{DD} = 50$ V dc			25	ns
2N6903		$V_{DD} = 100$ V dc			25	ns
Rise time			t_r			
2N6901		$V_{DD} = 50$ V dc			80	ns
2N6903		$V_{DD} = 100$ V dc			80	ns

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 - Cont.						
Turn-off delay time			$t_{d(off)}$			
2N6901		V_{DD} = 50 V dc			45	ns
2N6903		V_{DD} = 100 V dc			40	ns
Fall time			t_f			
2N6901		V_{DD} = 50 V dc			80	ns
2N6903		V_{DD} = 100 V dc			80	ns
Subgroup 5						
Safe operating area test	3474	See figure 4 V_{DS} = 80% of rated V_{DS} and $V_{DS} \leq$ 200 V max				
High voltage dc SOA		t_p = 1 s				
Electrical measurements		See table III, steps 1, 2, 3, 4, 5, 6, and 7.				
Single pulse unclamped inductive switching	3470	See 4.5.4 c = 0, 116 devices				
Electrical measurements		See table III herein, steps 1, 2, 3, 4, 5, and 6				
Subgroups 6						
Not applicable						
Subgroup 7						
Gate charge	3471	Condition A or B				
On-state gate charge			$Q_{g(on)}$			nC
2N6901				1.3	3.5	
2N6903				1.5	3.5	

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 7 - Cont.						
Gate to source charge			Q_{gs}			nC
2N6901				0.3	1.0	
2N6903				0.2	0.8	
Gate to drain charge			Q_{gd}			nC
2N6901				1.0	2.9	
2N6903				0.8	2.7	
Reverse recovery time	3473	$V_{DD} \leq 30$ V $di/dt = 100$ A/µs $I_F = 1$ A	t_{rr}			
2N6901					250	ns
2N6903					500	ns

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

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

Inspection	MIL-STD-750		Qualification conformance inspection
	Method	Conditions	
Subgroup 1			45 devices c = 1
Temperature cycling	1051	Test condition G, 200 cycles	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table III, steps 1, 2, 3, 4, 5, 6, and 7	
Subgroup 2 1/			45 devices c = 1
Steady-state reverse bias	1042	Condition A: 1,000 hours	
Electrical measurements		See table III, steps 1, 2, 3, 4, 5, 6, and 7	
Steady-state gate bias	1042	Condition B: 1,000 hours	
Electrical measurements		See table III, steps 1, 2, 3, 4, 5, 6, and 7	
Subgroup 3			
Not applicable			
Subgroup 4			5 devices c = 0
Thermal resistance	3161	$R_{\theta JC}$ = 15°C/W max. See 4.5.2	
Subgroup 5			
Not applicable			

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

TABLE III. Groups A, B, C, and E electrical measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Breakdown voltage, drain to source	3407	I_D = 1 mA dc Bias condition C V_{GS} = 0 V	$V_{(BR)DSS}$			
	2N6901				100		V dc
	2N6903				200		V dc
2.	Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ I_D = 1 mA dc	$V_{GS(th)1}$	1.0	2.0	V dc
3.	Gate current	3411	V_{GS} = +10 V dc and -10 V dc Bias condition C V_{DS} = 0 V	I_{GSS1}		±100	nA dc
4.	Drain current	3413	Bias condition C V_{GS} = 0 V	I_{DSS1}			
	2N6901		V_{DS} = 80 V dc			50	µA dc
	2N6903		V_{DS} = 160 V dc			50	µA dc
5.	Static drain to source "on-state" resistance	3421	V_{GS} = 5 V dc Bias condition A Pulsed (see 4.5.1)	$r_{DS(on)1}$			
	2N6901		I_D = 1.07 A dc			1.4	ohm
	2N6903		I_D = 0.62 A dc			3.65	ohm
6.	Drain to source "on-state" voltage	3405	V_{GS} = 5 V dc Bias condition A Pulsed (see 4.5.1)	$V_{DS(on)}$			
	2N6901		I_D = 1.69 A dc			2.4	V
	2N6903		I_D = 0.98 A dc			6.0	V
7.	Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1) V_{GS} = 0 V	V_{SD}			
	2N6901		I_S = 1.69 A dc		0.8	1.6	V
	2N6903		I_S = 0.98 A dc		0.8	1.6	V
8.	Thermal response	3161	See 4.5.3	ΔV_{SD}			

See footnotes at the end of table.

TABLE III. Groups A, B, C, and E electrical measurements - Continued.

1/ The electrical measurements for table IVa (JANS) of MIL-S-19500 are as follows:

a. Subgroup 3, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

b. Subgroup 4, see table III herein, steps 1, 2, 3, 4, 5, 6, 7, and 8.

c. Subgroup 5, Accelerated steady-state operation life, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7. No more than 15% of the sample shall be permitted to have a $\Delta V_{BR(DSS)}$ shift of more than 10% and the $\Delta I_{(DSS)}$ greater than 50 µA.

Accelerated steady-state gate stress, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

2/ The electrical measurements for table IVb (JANTX and JANTXV) of MIL-S-19500 are as follows:

a. Subgroup 2, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

b. Subgroup 3, see table III herein, steps 1, 2, 3, 4, 5, 6, 7, and 8.

c. Subgroup 6, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

3/ The electrical measurements for table V of MIL-S-19500 are as follows:

a. Subgroup 2, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

b. Subgroup 3, see table III herein, steps 1, 2, 3, 4, 5, 6, and 7.

c. Subgroup 6, see table III herein, steps 1, 2, 3, 4, 5, 6, 7, and 8.

4.5.4 Unclamped inductive switching.

a. Peak current, I_D - rated I_{D1}.

b. Peak gate voltage, V_{GS} - 10 V.

c. Gate to source resistor, R_{GS} - - - - - - - - - - - - - - - - -

d. Initial case temperature - +25°C, +10 -5°C.

e. Inductance - 100 µH ±10%.

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

4.5.5 Gate stress test.

V_{GS} = 15 V min.
t = 250 µs min.

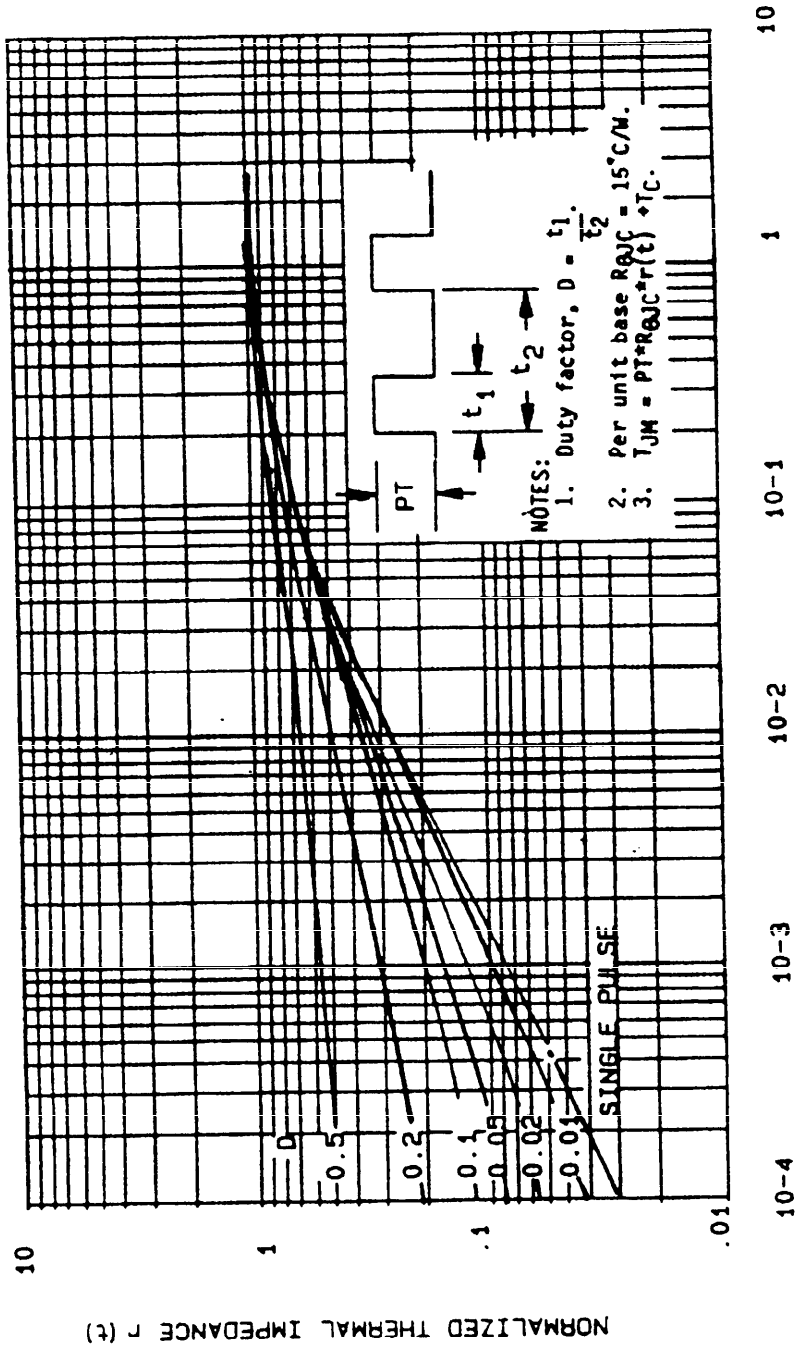


FIGURE 3. Transient thermal response.

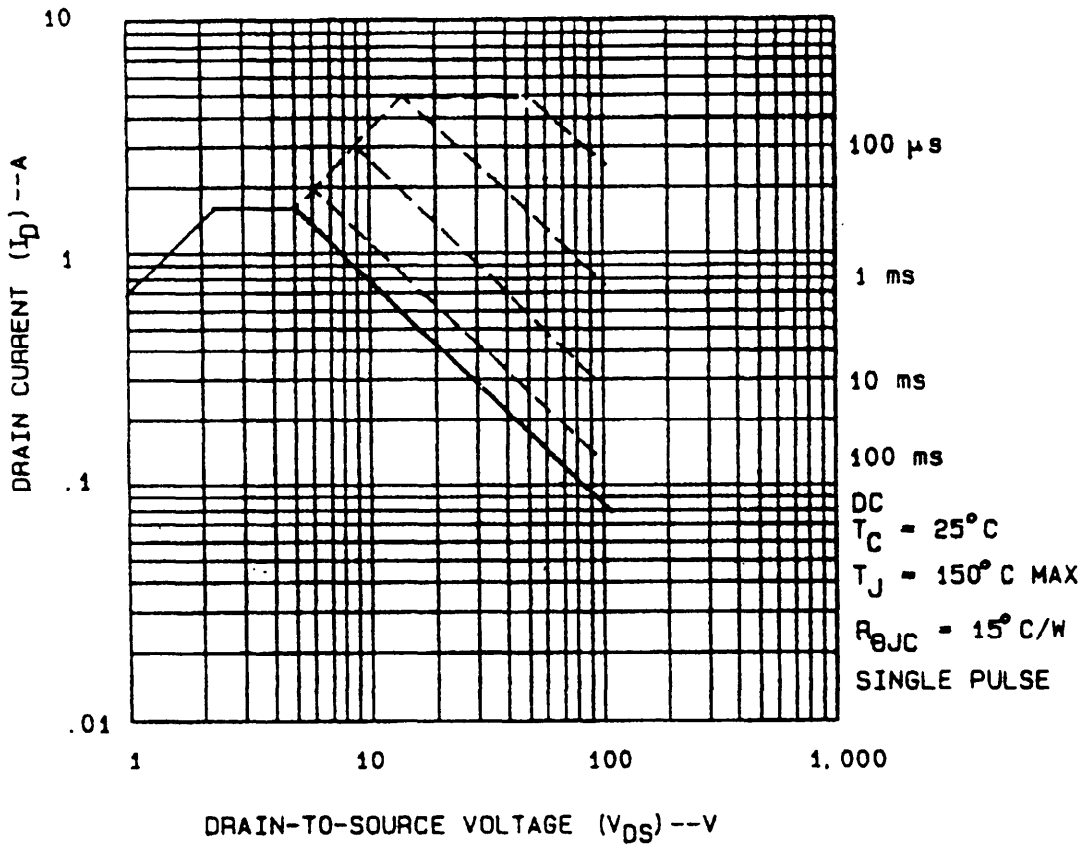


FIGURE 4. Maximum safe operating area.

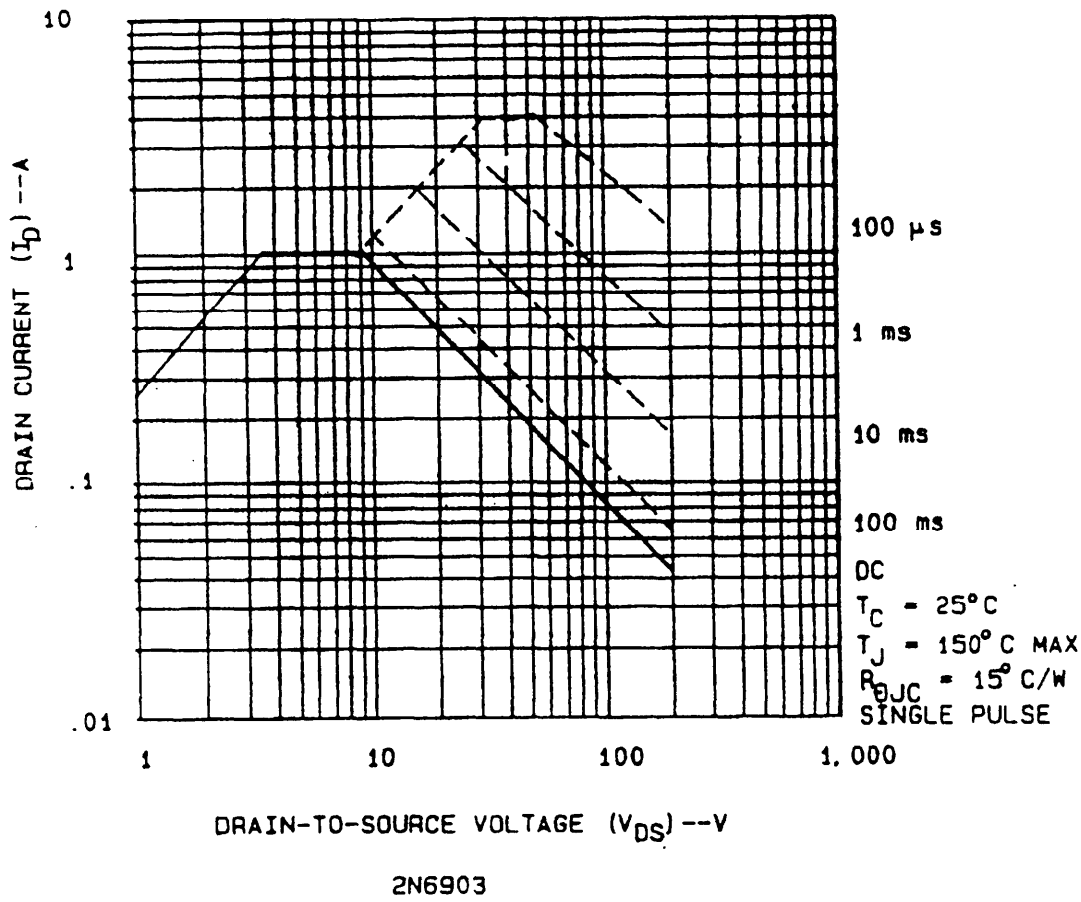


FIGURE 4. Maximum safe operating area - Continued.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

6. NOTES

6.1 Notes. The notes specified in MIL-S-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Issue of DODISS to be cited in the solicitation.

b. The lead finish as specified (see 3.3.1).

c. Type designation and quality product assurance level.

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

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, MI
Navy - SH
Air Force - 19, 85
DLA - ES

User activities:
Army - SM
Navy - AS, CG, MC, OS
Air Force - 13, 15

Preparing activity:
Army - ER

Agent:
DLA - ES

(Project 5961-1301)

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.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-S-19500/570A	2. DOCUMENT DATE (YYMMDD) 930331

3. DOCUMENT TITLE: Semiconductor device, Field Effect Transistor, N-Channel, Silicon, Logic-level, Types: 2N6901, and 2N6903 JANTX, JANTXV and JANS

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) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME US Army Research Laboratory Electronics and Power Sources Directorate	b. TELEPHONE (Include Area Code) (1) Commercial: (908) 544-2414 (2) AUTOVON: 995-2414
c. ADDRESS (Include Zip Code) ATTN: AMSRL-EP-RD Fort Monmouth, NJ 07703-5601	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340

DD Form 1426, OCT 89 — Previous editions are obsolete. — 98/290

[Subgroup 2 of table I herein] [Subgroup 2 of table I herein]