The documentation and process conversion measures necessary to comply with this revision shall be completed by 08 March 1998.

INCH POUND

MIL-PRF-19500/555G
08 December 1997
SUPERSEDING
MIL-S-19500/555F
31 March 1995

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, FIELD EFFECT TRANSISTOR, N-CHANNEL, SILICON
TYPES 2N6788, 2N6788U, 2N6790, 2N6790U, 2N6792, 2N6792U, 2N6794 AND 2N6794U
JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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 an N-channel, enhancement-mode, MOSFET, power transistor. Four levels of product assurance are provided for each 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 figures 1 (TO-205AF), 3 (LCC), and figures 4, 5, 6, and 7 for JANHC and JANKC (die) dimensions.

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

Type 4/	P_T 1/ T_C = +25°C	P_T T_C = +25°C	V_{DS}	V_{DG}	V_{GS}	I_{D1} T_C = +25°C	I_{D2} T_C = +100°C	I_S	I_{DM} 3/	T_J and T_{STG}	V_{DS} and V_{DG} 100k ft. altitude	$R_{\Theta JC}$
	W	W	V dc	V dc	V dc	A dc	A dc	A dc	A (pk)	°C		°C/W
2N6788	20	0.8	100	100	±20	6.0	3.5	6.0	24	-55°		6.25
2N6790	20	0.8	200	200	±20	3.5	2.25	3.5	14	to		6.25
2N6792	20	0.8	400	400	±20	2.0	1.25	2.0	8	+150°	300	6.25
2N6794	20	0.8	500	500	±20	1.5	1.0	1.5	6		300	6.25

1/ Derate linearly 0.16 W/°C for T_C > +25°C.

$$P_T = \frac{T_{J(\max)} - T_C}{R_{\theta JX}}$$

2/ $$I_D = \sqrt{\frac{T_{J(\max)} - T_C}{(R_{\theta JX}) \; x \; (R_{DS(on)} \; at \; T_{J(\max)}}}$$

3/ $I_{DM} = 4I_{D1}$; I_{D1} as calculated in footnote 2/.

4/ Electrical characteristics for "U" suffix devices are identical to the corresponding non"U" suffix devices unless otherwise specified.

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

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

Type 2/	Min $V_{(BR)DSS}$ V_{GS} = 0 I_D = 1.0 mA dc	$V_{GS(th)1}$ $V_{DS} \geq V_{GS}$ I_D = 0.25 mA		Max I_{DSS1} V_{GS} = 0	Max $r_{DS(on)}$ 1/ V_{GS} = 10 V dc $I_D = I_{D2}$	
				V_{DS} = 80 percent of rated V_{DS}	T_J = +25° C	T_J = +150° C
	V dc	V dc		µA dc	Ohms	Ohms
		Min	Max			
2N6788	100	2.0	4.0	25	0.30	0.60
2N6790	200	2.0	4.0	25	0.80	1.80
2N6792	400	2.0	4.0	25	1.80	4.50
2N6794	500	2.0	4.0	25	3.00	7.50

1/ Pulsed (see 4.5.1).
2/ Electrical characteristics for "U" suffix devices are identical to the corresponding non"U" suffix devices unless otherwise specified.

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-PRF-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 Defense Printing Service Detachment Office, Building 4D (Customer Service), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 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.

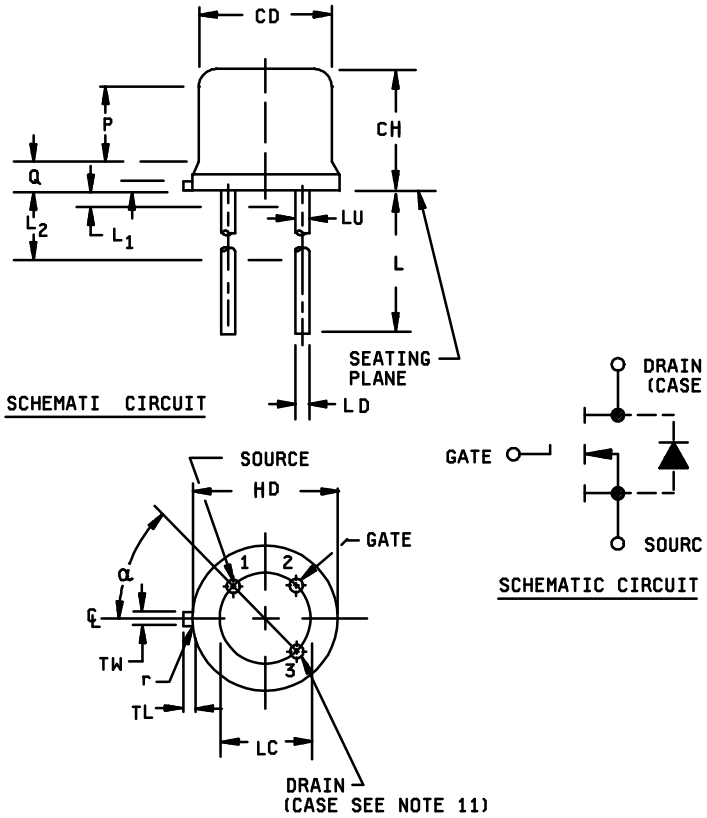
3. REQUIREMENTS

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

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

3.3 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, and figures 1 (T0-205), 3 (LCC), 4, 5, 6, and 7 (die) herein.

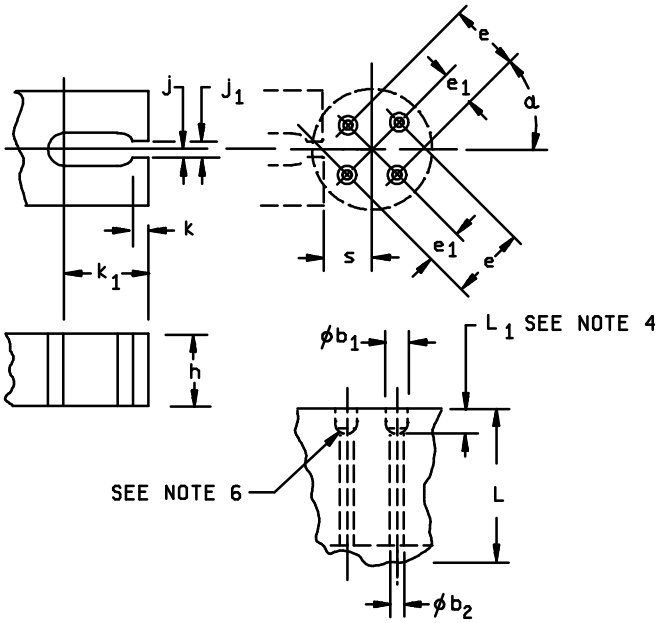
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	6
CH	.160	.180	4.07	4.57	
HD	.335	.370	8.51	9.40	4
LC	.200 TP		5.08 TP		7
LD	.016	.021	0.41	0.53	8, 9
LL	.500	.750	12.70	19.05	8, 9
LU	.016	.019	0.41	0.48	8, 9
L_1		.050		1.27	8, 9
L_2	.250		6.35		8, 9
P	.100		2.54		6
Q		.050		1.27	5
r		.010		0.25	10
TL	.029	.045	0.74	1.14	4
TW	.028	.034	0.71	0.86	3
α	45 TP		45 TP		7



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 inch (0.028 mm).
4. Dimension k measured from maximum HD.
5. Outline in this zone is not controlled.
6. Dimension CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001, -.000 inch (1.37 +0.03, -0.00 mm) below seating plane shall be within .007 inch (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. LU applies between L_1 and L_2. LD applies between L_2 and LL 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.
12, In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.

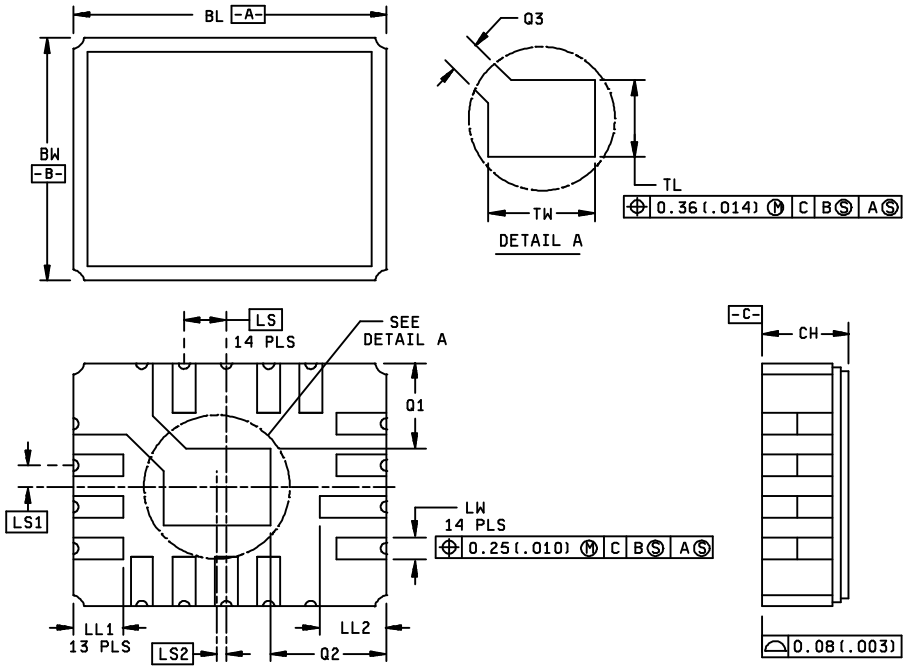
FIGURE 1. Physical dimensions for TO-205AF.

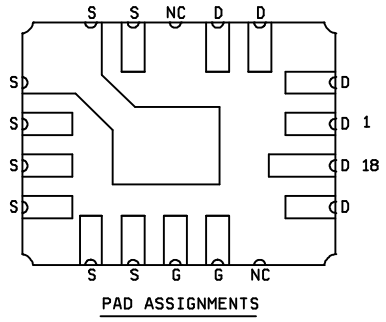
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
ϕb_1	.0595	.0605	1.51	1.54	
ϕb_2	.0325	.0335	0.83	0.85	
e	.1995	.2005	5.07	5.09	
e_1	.0995	.1005	2.53	2.55	
h	.150 Nominal		3.81 Nominal		
j	.0175	.0180	0.44	0.46	
j_1	.0350	.0355	0.89	0.90	
k	.009	.011	0.23	0.28	
k_1	.125 Nominal		3.18 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°	



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 inch (3.18 ±0.25 mm) from the seating surface of the gauge. A force of 8 ±.5 ounces shall then be applied parallel and symmetrical to the device's cylindrical axis. The 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.

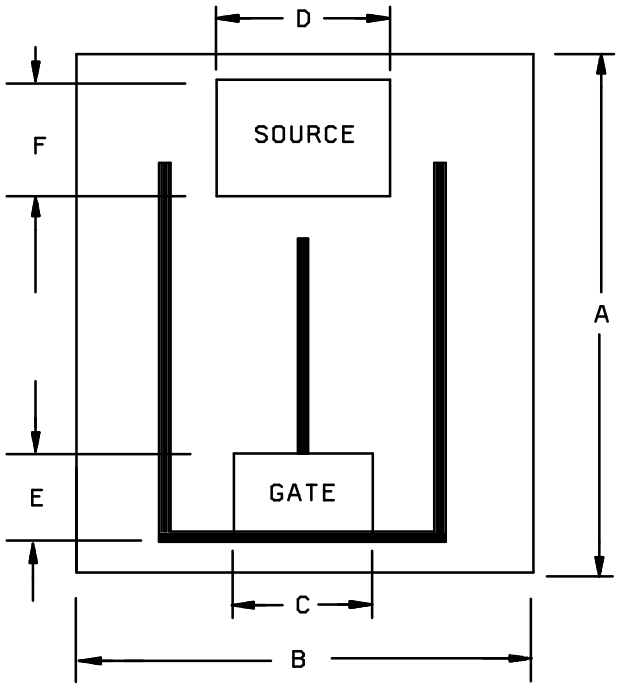




Sym.	Inches		Millimeters	
	Min	Max	Min	Max
BL	.345	.360	8.77	9.14
BW	.280	.295	7.12	7.49
CH	.095	.115	2.42	2.92
LL1	.040	.055	1.02	1.39
LL2	.055	.065	1.40	1.65
LS	.050 BSC		1.27 BSC	
LS1	.025 BSC		0.635 BSC	
LS2	.008 BSC		0.203 BSC	
LW	.020	.030	0.51	0.76
Q1	.105 REF		2.67 REF	
Q2	.120 REF		3.05 REF	
Q3	.045	.055	1.15	1.39
TL	.070	.080	1.78	2.03
TW	.120	.130	3.05	3.30

NOTES:
1. Dimensions are in inches. Metric equivalents are given for information only.
2. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 3. Physical dimensions for LCC.

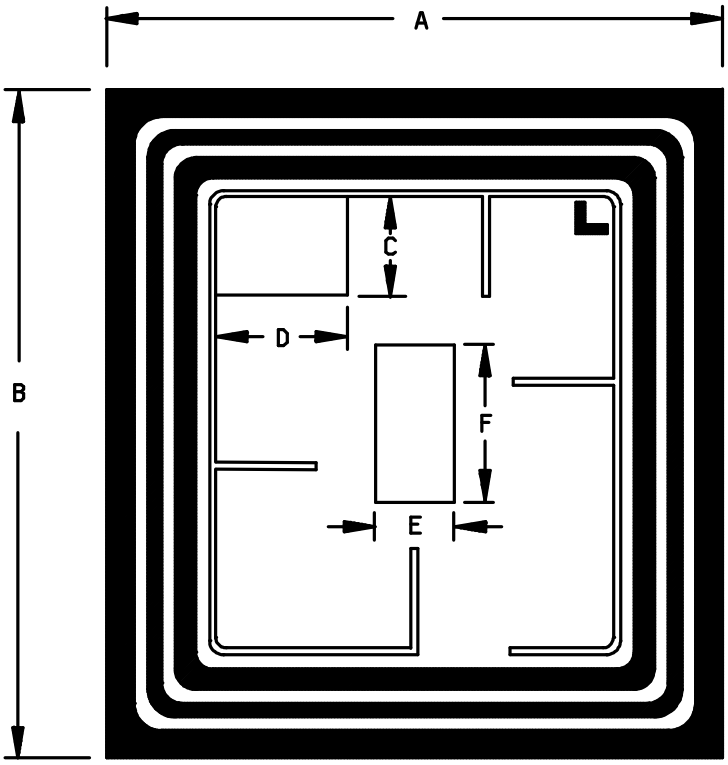


A version

Ltr	Dimensions - 2N6788				Dimensions - 2N6790				Dimensions - 2N6792, 2N6794			
	Inches		Millimeters		Inches		Millimeters		Inches		Millimeters	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	.107	.121	2.72	3.07	.094	.112	2.39	2.85	.131	.147	3.33	3.73
B	.078	.088	1.98	2.24	.083	.099	2.11	2.52	.090	.106	2.29	2.69
C	.020	.030	0.51	0.76	.018	.028	0.46	0.71	.022	.032	0.56	0.81
D	.027	.037	0.69	0.94	.028	.038	0.71	0.97	.028	.038	0.71	0.97
E	.013	.023	0.33	0.58	.015	.025	0.38	0.64	.015	.025	0.38	0.64
F	.019	.029	0.48	0.74	.018	.028	0.46	0.71	.020	.030	0.51	0.76

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Die thickness = .019 ±.005 inch (0.48 ±0.13 mm).
4. Back metal: Cr - Ni - Ag.
5. Top metal: Al.
6. Back contact: Drain.
7. Layout of gate fingers shown is typical, specific layout register in accordance with Form 36D.

FIGURE 4. Physical dimensions JANHCA and JANKCA.

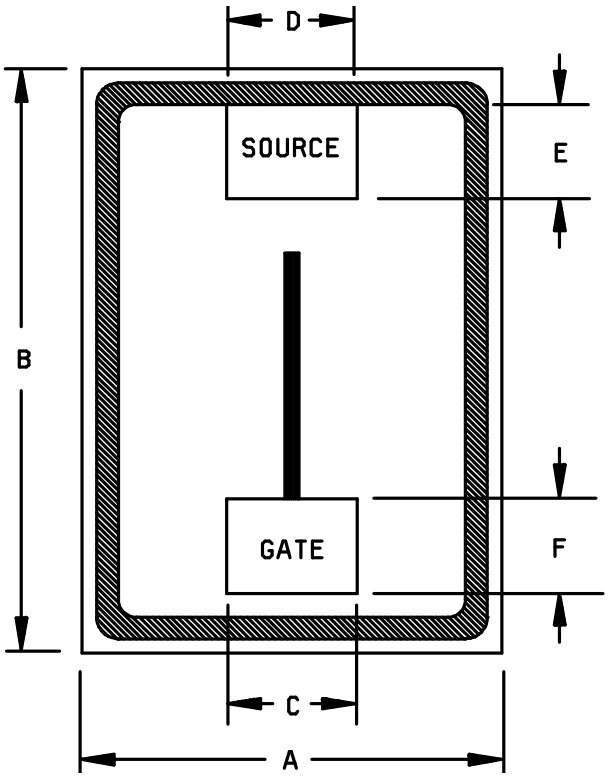


B version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.114	.118	2.9	3.0
B	.120	.124	3.0	3.1
C	.018	.022	0.46	0.56
D	.028	.032	0.71	0.81
E	.018	.022	0.46	0.56
F	.029	.033	0.74	0.84

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Die thickness = .014 ±.005 inch (0.36 ±0.13 mm).
4. Back metal: Al - Ti - Ni.
5. Top metal: Al.
6. Back contact: Drain.

FIGURE 5. Physical dimensions JANHCB and JANKCB.

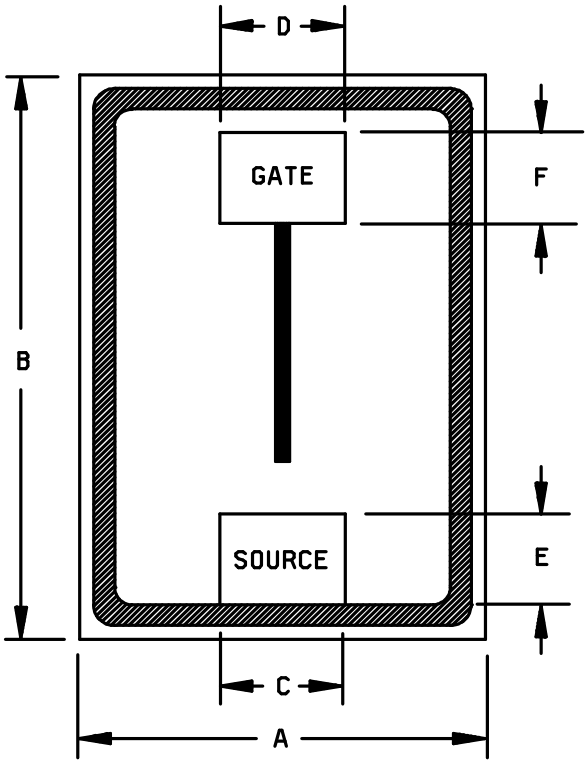


C version

Dimensions 2N6788, 2N6790				
Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	.0858	.0898	2.18	2.28
B	.087	.091	2.21	2.31
C	.0258	.0298	0.65	0.76
D	.0253	.0293	0.64	0.74
E	.017	.021	0.43	0.53
F	.016	.020	0.41	0.51

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Die thickness = .015 ±.005 inch (0.38 ±0.13 mm).
4. Back metal: Ag - Ti - Ni.
5. Top metal: Al.
6. Back contact: Drain.

FIGURE 6. Physical dimensions JANHCC and JANKCC.



D version

Dimensions 2N6792 and 2N6794				
Ltr	Inches		Millimeters	
	Min	Max	Min	Max
A	.093	.102	2.36	2.59
B	.140	.144	3.56	3.66
C	.025	.029	0.64	0.74
D	.026	.030	0.66	0.76
E	.016	.020	0.41	0.51
F	.017	.021	0.43	0.53

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Die thickness = .015 ±.005 inch (0.38 ±0.13 mm).
4. Back metal: Ag - Ti - Ni.
5. Top metal: Al.
6. Back contact: Drain.

FIGURE 7. Physical dimensions JANHCD and JANKCD.

3.3.1 Lead material and finish. Lead material shall be Kovar or Alloy 52; a copper core is permitted (for T0-205AF). 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 6.4).

3.3.2 Internal construction. Multiple chip construction shall not be permitted.

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

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 static charge. However, the following handling practices are recommended (see 3.5).

a. Devices should be handled on benches with conductive and grounded surface.

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 should 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.

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

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3.

3.8 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 6.2).

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. Alternate flow is allowed for qualification inspection in accordance with MIL-PRF-19500.

4.2.1 Group E. Group E inspection shall be conducted in accordance with MIL-PRF-19500, and table II herein.

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-STD-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/	Gate stress test (see 4.5.5)	Gate stress test (see 4.5.5)
1/ 2/	Method 3470 (see 4.5.4)	Method 3470 (see 4.5.4)
1/	Method 3161 (see 4.5.3)	Method 3161 (see 4.5.3)
3	Temperature cycling, MIL-STD-750, method 1051, test condition G	Temperature cycling, MIL-STD-750, method 1051, test condition G
9 1/	I_{GSS1}, I_{DSS1}	
11	Subgroup 2 of table I herein I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)1}$ of table I, subgroup 2 herein; ΔI_{GSS1} = ±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.	Subgroup 2 of table I herein I_{GSS1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(th)1}$
12 3/	MIL-STD-750, method 1042, condition A	MIL-STD-750, method 1042, condition A; or accelerated test T_A = +175°C, t = 48 hours
13	Subgroups 2 and 3 of table I herein; ΔI_{GSS1} = ±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_{GSS1} = ±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 initial value. $\Delta V_{GS(th)1}$ = ±20 percent initial value.

1/ Shall be performed anytime before screen 4.
2/ This test method in no way implies a repetitive 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/ Use of accelerated screening option (specified in screen 12 of MIL-PRF-19500) requires a 1,000 hour life test in accordance with the applicable group E, subgroup 2 life test and end-points specified herein. This data shall be provided to the qualifying activity for review and acceptance.

4.3.1 Screening (JANHC and JANKC). Screening of die shall be in accordance with MIL-PRF-19500, as a minimum, die shall be 100 percent probed in accordance with group A, subgroup 2, except test current shall not exceed 20 A.

4.3.2 JANHC and JANKC die. Qualification shall be in accordance with MIL-PRF-19500.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500. Alternate flow is allowed for 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. Electrical measurements (end-points) shall be in accordance with the inspections of table I, group A, 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 table VIa (JANS) and table VIb (JANTX and JANTXV) of MIL-PRF-19500 and as follows. Electrical measurements (end-points) shall be in accordance with the inspections of table I, group A, subgroup 2 herein.

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

Subgroup	Method	Conditions
B3	1051	Test condition G.
B3	2037	Test condition A. All internal wires for each device shall be pulled separately. If group B3 is to be continued to C6, strength test may be performed after C6.
B4	1042	Test condition D, 2,000 cycles. The heating cycle shall be 1 minute minimum. No heat sink nor forced air cooling on the device shall be permitted during the "on" cycle.
B5	1042	A separate sample may be pulled for each test. Accelerated steady-state reverse bias; test 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 mA. Read and record I_{DSS} (pre and post).
B5	1042	Accelerated steady-state gate stress; test condition B, V_{GS} = rated, T_A = +175° C, t = 24 hours.
B6		See 4.5.2

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

Subgroup	Method	Conditions
B2	1051	Test condition G.
B3	1042	Test condition D, 2,000 cycles. The heating cycle shall be 1 minute minimum. No heat sink nor forced air cooling on the device shall be permitted during the "on" cycle.
B3	2037	Test condition A. All internal wires for each device shall be pulled separately. If group B3 is to be continued to C6, bond strength test may be performed after C6.
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 table VII of MIL-PRF-19500 and as follows. Electrical measurements (end-points) shall be in accordance with the inspections of table I, group A, subgroup 2 herein.

4.4.3.1 Group C inspection (table VII of MIL-PRF-19500).

Subgroup	Method	Conditions
C2	2036	Test condition E (not required for LCC).
C6	1042	Test condition D, 6,000 cycles. The heating cycle shall be 1 minute minimum. No heat sink nor forced air cooling on the device shall be permitted during the "on" cycle.

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. $R_{\Theta JC(max)}$ = 6.25° C/W.

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

b. I_H drain heating current ..... 1 A minimum.

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

d. V_H drain-source heating voltage ..... 14 V minimum.

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

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

4.5.3 Thermal response ($Z_{\Theta JX}$ measurements). The $Z_{\Theta JX}$ measurements shall be performed in accordance with method 3161 of MIL-STD-750. The maximum limit (not to exceed figure 8, thermal impedance curves and the group A subgroup 2 limits) for $Z_{\Theta JX}$ in screening (table IV of MIL-PRF-19500) shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capabliity 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, 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 ..... 1 A minimum.

c. t_H heating time ..... 10 ms.

d. V_H drain-source heating voltage ..... 14 V minimum.

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

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

4.5.4 Single pulsed unclamped inductive switching.

a. Peak current, I_D ..... 2.2 A.

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

c. Gate to source resistor, R_{GS} ..... $25 \leq R_g \leq 200\Omega$.

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

e. Inductance, L ..... 100 µH ±10 percent.

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

4.5.5 Gate stress test.

V_{GS} = ±30 V minimum; t = 250 µs minimum.

TABLE I. Group A inspection.

Inspection 1/, 4/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Thermal impedance 2/	3161	See 4.5.3	$Z_{\theta JC}$		2.3	°C/W
Breakdown voltage, drain to source	3407	I_D = 1.0 mA dc, bias condition C, V_{GS} = 0 V dc	$V_{(BR)DSS}$			
2N6788				100		V dc
2N6790				200		V dc
2N6792				400		V dc
2N6794				500		V dc
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, I_D = .25 mA	$V_{GS(th)1}$	2.0	4.0	V dc
Gate current	3411	V_{GS} = +20 V dc and -20 V dc, bias condition C, V_{DS} = 0	I_{GSS1}		±100	nA dc
Drain current	3413	V_{DS} = 80 percent of rated V_{DS}, bias condition C, V_{GS} = 0	I_{DSS1}		25	µA dc
Static drain to source "on"-state resistance	3421	V_{GS} = 10 V dc, condition A, pulsed (see 4.5.1), I_D = rated I_{D2} (see 1.3)	$r_{DS(on)1}$			
2N6788					0.30	Ω
2N6790					0.80	Ω
2N6792					1.80	Ω
2N6794					3.00	Ω
Static drain to source "on"-state resistance	3421	V_{GS} = 10 V dc, pulsed, (see 4.5.1); condition A, I_D = rated I_{D1} (see 1.3)	$r_{DS(on)2}$			
2N6788					0.35	Ω
2N6790					0.85	Ω
2N6792					1.90	Ω
2N6794					3.10	Ω
Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1), $I_S = I_{D1}$	V_{SD}			
2N6788					1.8	V
2N6790					1.5	V
2N6792					1.4	V
2N6794					1.2	V

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/, 4/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 3						
High temperature operation:		$T_C = T_J = +125^\circ C$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ $I_D = .25$ mA dc	$V_{GS(th)2}$	1.0		V dc
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	V_{DS} = 80 percent rated, bias condition C, pulsed (see 4.5.1)	I_{DSS2}		.25	mA dc
Static drain to source "on"-state resistance	3421	V_{GS} = 10 V dc, pulsed (see 4.5.1), I_D = rated I_{D2} (see 1.3)	$r_{DS(on)3}$			
2N6788					0.54	Ω
2N6790					1.50	Ω
2N6792					4.00	Ω
2N6794					6.60	Ω
Low temperature operation:		$T_C = T_J = -55^\circ C$				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, $I_D = .25$ mA dc	$V_{GS(th)3}$		5.0	V dc
Subgroup 4						
Switching time test	3472	I_D = rated I_{D1} (see 1.3), V_{GS} = 10 V dc, Gate drive impedance = 7.5 Ω				
Turn-on delay time			$t_{d(on)}$			
2N6788		V_{DD} = 35 V dc			40	ns
2N6790		V_{DD} = 74 V dc			40	ns
2N6792		V_{DD} = 175 V dc			40	ns
2N6794		V_{DD} = 225 V dc			40	ns
Rise time			t_r			
2N6788		V_{DD} = 35 V dc			70	ns
2N6790		V_{DD} = 74 V dc			50	ns
2N6792		V_{DD} = 175 V dc			35	ns
2N6794		V_{DD} = 225 V dc			30	ns

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/, 4/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4 - Continued						
Turn-off delay time			$t_{d(off)}$			
2N6788		V_{DD} = 35 V dc			40	ns
2N6790		V_{DD} = 74 V dc			50	ns
2N6792		V_{DD} = 175 V dc			60	ns
2N6794		V_{DD} = 225 V dc			60	ns
Fall time			t_f			
2N6788		V_{DD} = 35 V dc			70	ns
2N6790		V_{DD} = 74 V dc			50	ns
2N6792		V_{DD} = 175 V dc			35	ns
2N6794		V_{DD} = 225 V dc			30	ns
Subgroup 5						
Safe operating area test	3474	See figure 9, V_{DS} = 80 percent of rated V_{DS}, $V_{DS} \leq$ 200 V, t_p = 10 ms				
Electrical measurements		See table I, group A herein				
Single pulse unclamped inductive switching 3/	3470	See 4.5.4, 116 devices, c = 0				
Electrical measurements		See table I, group A herein				
Subgroup 6						
Not applicable						
Subgroup 7						
Gate charge	3471	Condition B				
On-state gate charge			$Q_{g(on)}$			nC
2N6788					17.0	
2N6790					14.3	
2N6792					15.5	
2N6794					16.7	

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/, 4/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 7 - Continued						
Charge gate to source			Q_{gs}			nC
2N6788					4.0	
2N6790					3.0	
2N6792					2.6	
2N6794					3.0	
Charge gate to drain			Q_{gd}			nC
2N6788					8.0	
2N6790					9.0	
2N6792					8.3	
2N6794					8.7	
Reverse recovery time	3473	$V_{DD} \leq 50$ V, $d_i/d_t \leq 100$ A/μs, $I_F = I_{D1}$	t_{rr}			ns
2N6788					240	
2N6790					400	
2N6792					650	
2N6794					900	

1/ For sampling plan, see MIL-PRF-19500.
2/ This test is required for the following end point measurements only (not intended for screen 13):

JANS - group B, subgroups 3 and 4;

JAN, JANTX, and JANTXV - group B, subgroups 2 and 3;
group C, subgroup 6;
group E, subgroup 1

3/ This test need not be performed in group A when performed as a 100 percent screen.
4/ Electrical characteristics for "U" suffix devices are identical to the corresponding non"U" suffix devices unless otherwise specified.

TABLE II. Group E inspection (all product assurance levels).

Inspection	MIL-STD-750		Qualification conformance inspection
	Method	Conditions	
Subgroup 1			22 devices, c = 0
Temperature cycling	1051	Condition G, 200 cycles	
Hermetic seal	1071		
Electrical measurements		See table I, group A, subgroup 2	
Subgroup 2			22 devices, c = 0
Steady-state reverse bias	1042	Condition A, 1,000 hours	
Electrical measurements		See table I, group A, subgroup 2	
Steady-state gate bias	1042	Condition B, 1,000 hours, V_{GS} = 80 percent of rated (see 3.1)	
Electrical measurements		See table I, group A, subgroup 2	
Subgroup 3			
Not applicable			
Subgroup 4			10 devices, c = 0
Thermal resistance	3161	$R_{\Theta JC}$ = 6.25° C/W (maximum), See 4.5.2	
Subgroup 5			5 devices, c = 0
Barometric pressure (reduced)	1001	Test condition C, $V_{ISO} = V_{DS}$ maximum limit; I_{ISO} = .25 mA dc	
2N6792		V_{DS} = 300 V	
2N6794		V_{DS} = 300 V	

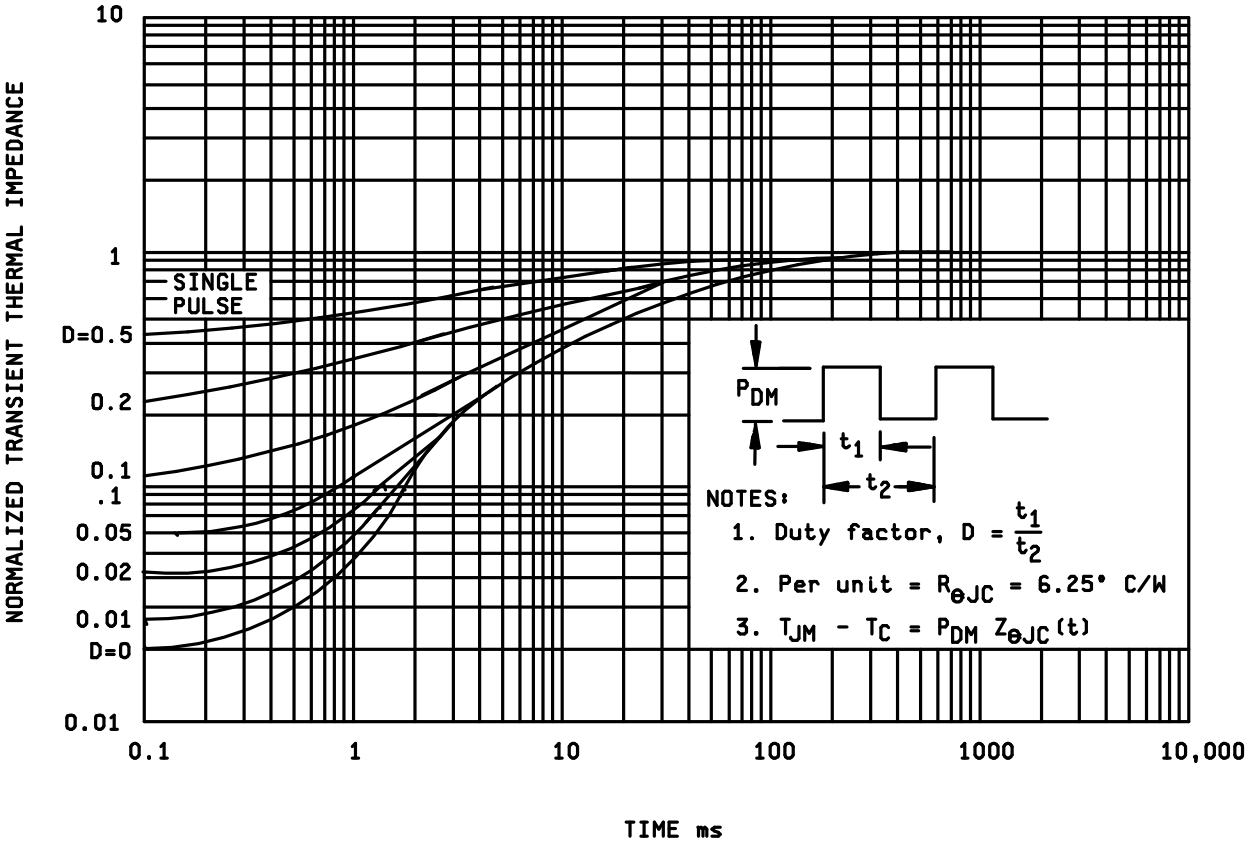
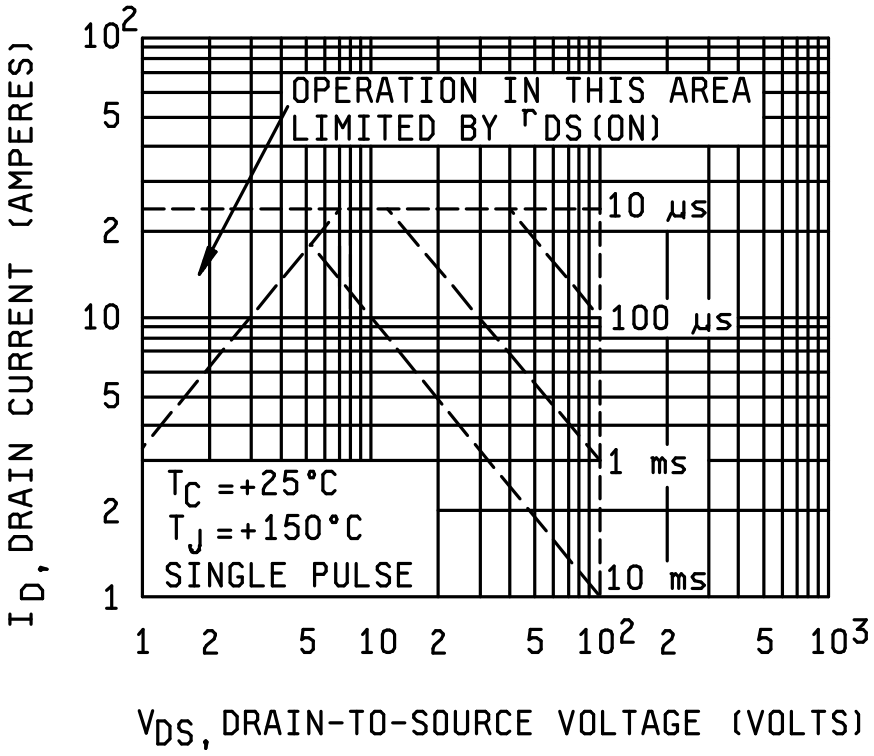
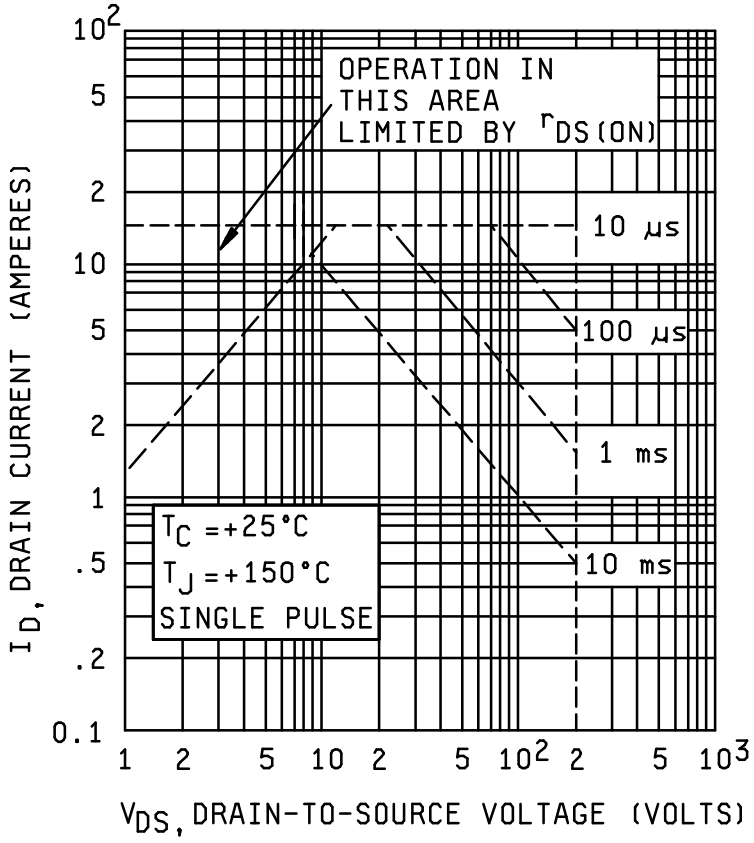


FIGURE 8. Transient thermal response.



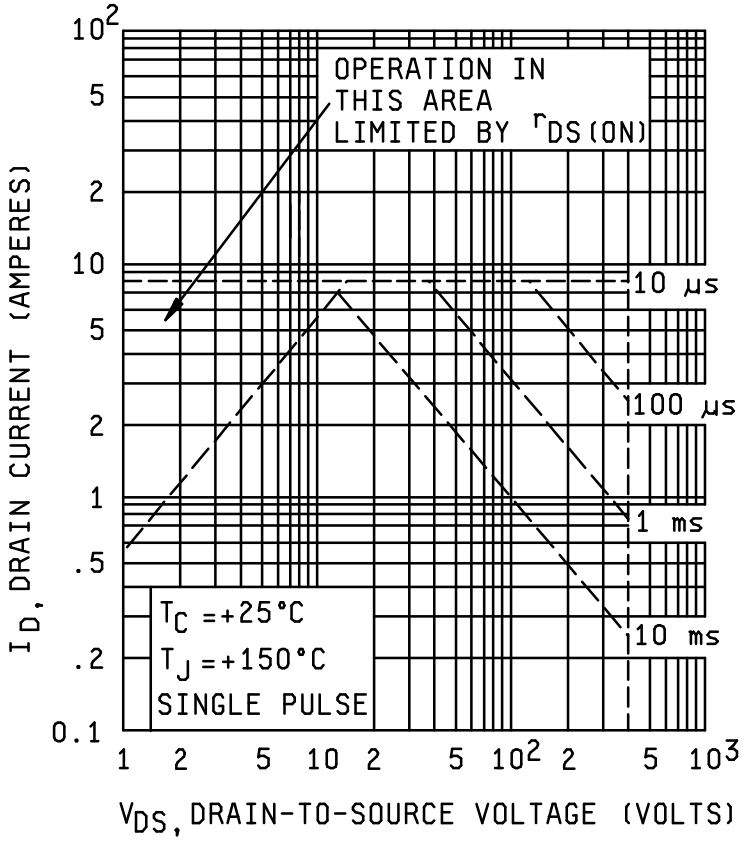
2N6788, 2N6788U

FIGURE 9. Maximum safe operating area.



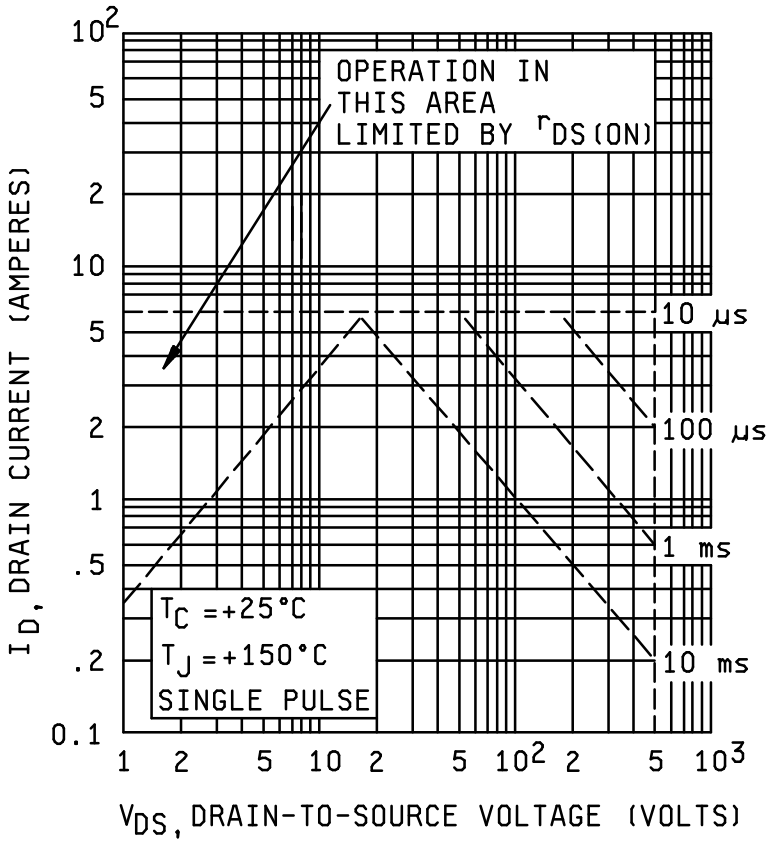
2N6790, 2N6790U

FIGURE 9. Maximum safe operating area - Continued.



2N6792, 2N6792U

FIGURE 9. Maximum safe operating area - Continued.



2N6792, 2N6792U

FIGURE 9. Maximum safe operating area - Continued.

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 material 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 Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-PRF-19500.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-PRF-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 and, if required, the specific issue of individual documents referenced (see 2.2.1).

b. Lead finish (see 3.3.1).

c. Type designation and product assurance level.

d. Packaging requirements (see 5.1).

6.3 Cross-reference complement list. Parts from this specification may be used to supersede the following commercial Part or Identifying Number (PIN) listed below. Complementary transistors are covered by MIL-PRF-19500/564:

Preferred types 1/	Commercial types
2N6788	IRFF120
2N6790	IRFF220
2N6792	IRFF320
2N6794	IRFF420
2N6788U	IRFE120
2N6790U	IRFE220
2N6792U	IRFE320
2N6794U	IRFE420

1/ Prefixes are JAN, JANTX, JANTXV, or JANS

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

6.5 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 Products List QPL-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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, DSCC-VQE, Columbus, OH 43216.

6.6 Suppliers of JANHC and JANKC die. The qualified die suppliers with the applicable letter version (example, JANHCA2N6782) will be identified on the QPL.

JANC ordering information			
PIN	Manufacturer		
	59993	18722	17856
2N6788	JANHCA2N6788	JANHCB2N6788	JANHCC2N6788
	JANKCA2N6788	JANKCB2N6788	JANKCC2N6788
2N6790	JANHCA2N6790	JANHCB2N6790	JANHCC2N6790
	JANKCA2N6790	JANKCB2N6790	JANKCC2N6790
2N6792	JANHCA2N6792	JANHCB2N6792	JANHCD2N6792
	JANKCA2N6792	JANKCB2N6792	JANKCD2N6792
2N6794	JANHCA2N6794	JANHCB2N6794	JANHCD2N6794
	JANKCA2N6794	JANKCB2N6794	JANKCD2N6794

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

CONCLUDING MATERIAL

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

Review activities:
Army - AR, MI, SM
Navy - AS, CG, MC
Air Force - 13, 19, 85, 99

Preparing activity:
DLA - CC

(Project 5961-1957)

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** MIL-PRF-19500/555G	**2. DOCUMENT DATE (YYMMDD)** 97/12/08

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, FIELD EFFECT TRANSISTOR, N-CHANNEL, SILICON TYPES 2N6788, 2N6788U, 2N6790, 2N6790U, 2N6792, 2N6792U, 2N6794 AND 2N6794U JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

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 Alan Barone	b. TELEPHONE (Include Area Code) (1) Commercial 614-692-0510 (2) AUTOVON 850-0510
c. ADDRESS (Include Zip Code) Defense Supply Center Columbus ATTN: DSCC-VAT Columbus, OH 43216-5000	**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