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

INCH-POUND

MIL-PRF-19500/542G
8 September 2003
SUPERSEDING
MIL-PRF-19500/542F
20 April 1998

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, FIELD EFFECT, N-CHANNEL,
SILICON, TYPES 2N6756, 2N6758, 2N6760, 2N6762,
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 N-channel, enhancement-mode, MOSFET, power transistors. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500 and two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figure 1 (TO-204AA; formerly TO-3), and figures 2, and 3 for JANHC and JANKC die dimensions. See 6.6 for unencapsulated device types.

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

Type	P_T (1) T_C = +25°C	P_T T_C = +25°C (free air)	V_{DS}	V_{DG}	V_{GS}	I_{D1} (2) (3) T_C = +25°C	I_{D2} (2) T_C = +100°C
	W	W	V dc	V dc	V dc	A dc	A dc
2N6756	75	4	100	100	± 20	14.0	9.0
2N6758	75	4	200	200	± 20	9.0	6.0
2N6760	75	4	400	400	± 20	5.5	3.5
2N6762	75	4	500	500	± 20	4.5	3.0

Type	I_S	I_{DM} (4)	T_J and T_{STG}	V_{ISO} 100,000 feet altitude	Max $r_{DS(on)}$ (1) V_{GS} = 10 V dc, I_D = I_{D2}		$R_{\theta JC}$ max
					T_J = +25°C	T_J = +150°C	
	A dc	A (pk)	°C		ohms	ohms	°C/W
2N6756	14.0	56	-55 to +150		0.18	0.36	1.67
2N6758	9.0	36	-55 to +150		0.4	0.84	1.67
2N6760	5.5	22	-55 to +150	400	1.0	2.5	1.67
2N6762	4.5	18	-55 to +150	500	1.5	3.75	1.67

See notes on next page.

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.

* 1.3 Maximum ratings - Continued.

(1) Derate linearly 0.6 W/°C for T_C > +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 4, maximum drain current graph.
(4) I_{DM} = 4 x I_{D1} as calculated in note 2.

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

Type	Min $V_{(BR)DSS}$ V_{GS} = 0 V I_D = 1 mA dc	$V_{GS(th)1}$ $V_{DS} \geq V_{GS}$ I_D = 0.25 mA	Max I_{DSS1} V_{GS} = 0 V	Max $r_{DS(on)1}$ (1) V_{GS} = 10 V dc $I_D = I_{D2}$
			V_{DS} = 80 percent of rated V_{DS}	T_J = +25°C
	V dc	V dc	µA dc	ohms
		Min Max		
2N6756	100	2.0 4.0	25	0.18
2N6758	200	2.0 4.0	25	0.4
2N6760	400	2.0 4.0	25	1.0
2N6762	500	2.0 4.0	25	1.5

(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.

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.

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

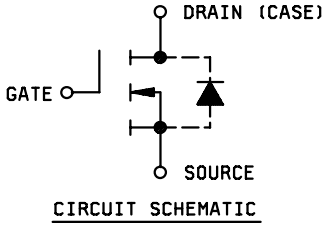
* 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1 (TO-204AA; formerly TO-3), and figures 2 and 3 for JANHC and JANKC die dimensions.

* 3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

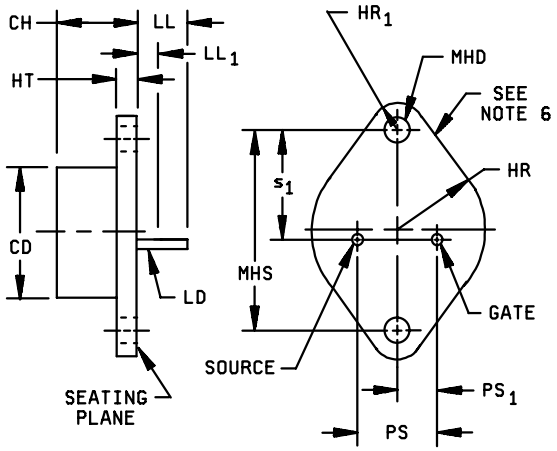
* 3.4.2 Internal construction. Multiple chip construction is not permitted to meet the requirements of this specification.

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

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	
CH	.250	.360	6.35	9.14	
HR	.495	.525	12.57	13.34	
HR_1	.131	.188	3.33	4.78	
HT	.060	.135	1.52	3.43	
LD	.038	.043	0.97	1.09	
LL	.312	.500	7.92	12.70	
LL_1		.050		1.27	
MHD	.151	.161	3.84	4.09	
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	3, 5
PS_1	.205	.225	5.21	5.72	3, 5
s_1	.655	.675	16.64	17.15	

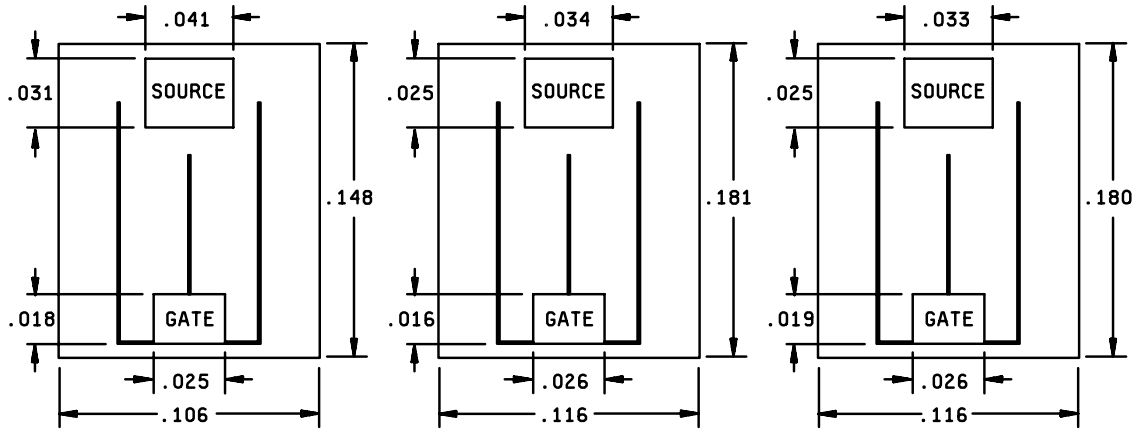


CIRCUIT SCHEMATIC



NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. These dimensions should be measured at points .050 inch (1.27 mm) and .055 inch (1.40 mm) below seating plane. When gauge is not used measurement will be made at the seating plane.
4. The seating plane of the header shall be flat within .001 inch (0.03 mm) concave to .004 inch (0.10 mm) convex inside a .930 inch (23.62 mm) diameter circle on the center of the header and flat within .001 inch (0.03 mm) concave to .006 inch (0.15 mm) convex overall.
5. Mounting holes shall be deburred on the seating plane side.
6. Drain is electrically connected to the case.
7. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

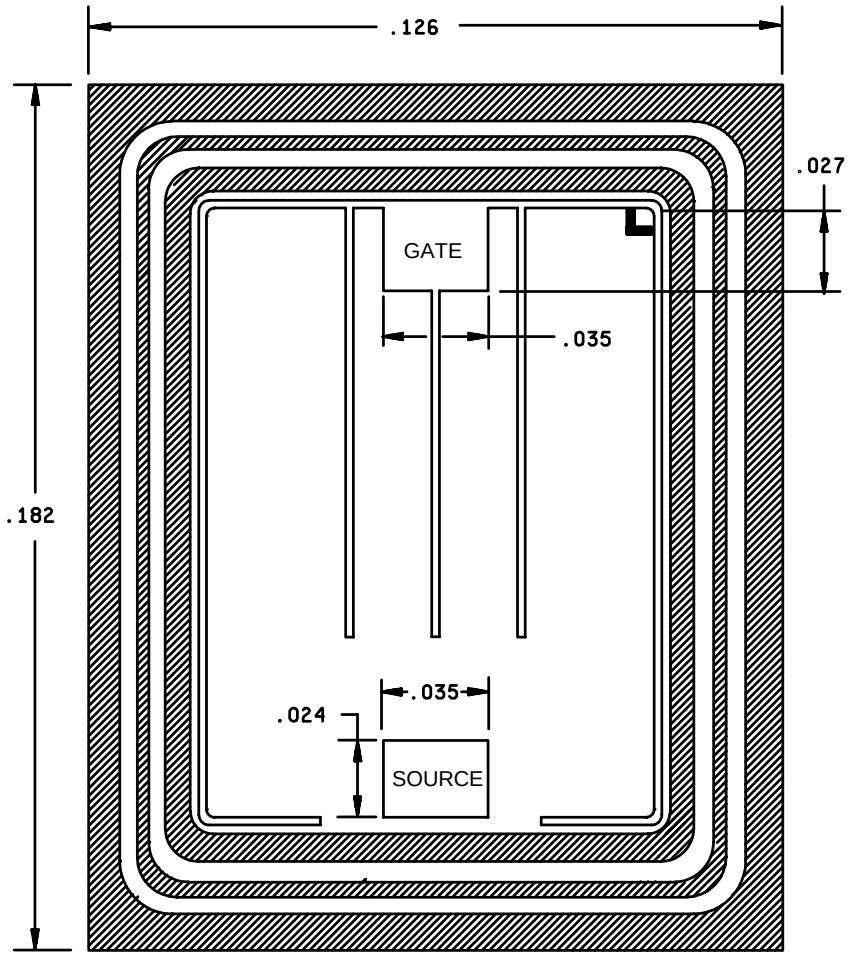
* FIGURE 1. Physical dimensions of transistor (TO-204AA).



Inch	mm	Inch	mm	Inch	mm
.016	0.41	.031	0.79	.116	2.95
.018	0.46	.033	0.84	.148	3.76
.019	0.48	.034	0.86	.180	4.57
.025	0.64	0.41	1.04	.181	4.60
.026	0.66	.106	2.69		

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is .005 inch (0.13 mm).
4. The physical characteristics of the die thickness are .0187 inch (0.475 mm). The back 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 and JANKCA (A-version).



Inch	mm
.024	0.61
.027	0.69
.035	0.89
.126	3.20
.182	4.62

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is .005 inch (0.13 mm).
4. The physical characteristics are the die thickness .014 inch (0.36 mm). The back metals are aluminum, nickel, and titanium. 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 3. JANHCB and JANKCB (B-version) die dimensions for 2N6756, 2N6758, 2N6760, and 2N6762.

* 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, $R \leq 100$ 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 MIL-PRF-19500, table IV) (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)	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}	Not applicable
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, t = 240 hours	Method 1042 of MIL-STD-750, test condition A; or t = 48 hours minimum at +175°C min
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.

* 4.3.1 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 table I, subgroup 2 except test current shall not exceed 20 amperes.

* 4.3.2 Gate stress test. Apply V_{GS} = 30 V minimum for t = 250 µs minimum.

* 4.3.3 Single pulse 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} ..... $25 \leq R_{GS} \leq 200$.

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

e. Inductance ..... 100 µH minimum.

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

g. Supply voltage V_{DD} ..... 50 V.

* 4.3.4 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 limit shall be derived by each vendor from the thermal response curves (see figure 5). The ΔV_{SD} measurement and conditions for each device in the qualification lot shall be submitted (read and record) in the qualification report. The chosen ΔV_{SD} shall be considered final after the manufacturer has had the opportunity to test five consecutive lots. The following parameter measurements shall apply:

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

b. I_H drain heating current ..... 1.5 A (min).

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

d. V_H drain-source heating voltage ..... 20 V (min).

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

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

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. Electrical measurements (end-points) shall be in accordance with the inspections of 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) and delta requirements 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.
B4	1042	Test condition D; the heating cycle shall be 1 minute minimum, 2,000 cycles.
B5	1042	Accelerated steady-state operation life; test condition A, V_{DS} = rated T_A = +175°C, t = 120 hours minimum. Read and record $V_{(BR)DSS}$ (pre and post at 1 mA = I_D. Read and record I_{DSS} (pre and post). Deltas for $V_{(BR)DSS}$ shall not exceed 10 percent and I_{DSS} shall not exceed 25 μA. Accelerated steady-state gate stress; condition B, V_{GS} = rated, T_A = +175°C, t = 24 hours.
B5	2037	Bond strength; test condition A.
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.
B3	1042	Test condition D, 2,000 cycles minimum. The heating cycle shall be 1 minute minimum.
B3	2037	Test condition A. All internal bond wires for each device shall be pulled separately.
B4	2075	See 3.4.2.

* 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.

Subgroup	Method	Conditions
C2	1056	Test condition A.
C2	2036	Test condition A; weight = 10 lbs, t = 15 s.
C5	3161	See 4.5.2.
C6	1042	Test condition D; 6,000 cycles minimum. The heating cycle shall be 1 minute minimum.

* 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. $R_{\theta JC}$ max = 1.67°C/W.

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

b. I_H drain heating current ..... 1.5 A (min).

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

d. V_H drain-source heating voltage ..... 20 V.

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

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

* 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						
Thermal response 2/	3161	See 4.3.4	$Z_{\theta JC}$		1.6	°C/W
Breakdown voltage, drain to source	3407	V_{GS} = 0 V dc, I_D = 1 mA dc, condition C	$V_{(BR)DSS}$			V dc
2N6756				100		
2N6758				200		
2N6760				400		
2N6762				500		
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, V_{DS} = 0, bias condition C	I_{GSSF1}		± 100	nA dc
Gate current	3411	V_{GS} = -20 V dc, V_{DS} = 0, bias condition C	I_{GSSR1}		± 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	µA 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)	$r_{DS(on)1}$			ohms
2N6756					0.18	
2N6758					0.4	
2N6760					1.0	
2N6762					1.5	
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)	$r_{DS(on)2}$			ohms
2N6756					.21	
2N6758					.49	
2N6760					1.22	
2N6762					1.80	

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 2 - Continued						
Forward voltage (source drain diode)	4011	Pulsed (see 4.5.1) V_{GS} = 0 V, $I_D = I_{D1}$	V_{SD}			V
2N6756					1.8	
2N6758					1.6	
2N6760					1.5	
2N6762					1.4	
Subgroup 3						
High temperature operation:		$T_C = T_J$ = +125°C				
Gate current	3411	Bias condition C $V_{GS} = \pm$ 20 V dc V_{DS} = 0 V dc	I_{GSS2}		$\pm$ 200	nA dc
Drain current	3413	Bias condition C V_{GS} = 0 V dc V_{DS} = 100 percent of rated V_{DS}	I_{DSS2}		1.0	mA dc
		V_{DS} = 80 percent of rated V_{DS}	I_{DSS3}		0.25	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}	$r_{DS(on)3}$			ohms
2N6756					0.34	
2N6758					0.8	
2N6760					2.2	
2N6762					3.3	
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc	$V_{GS(th)2}$	1.0		V dc
Low temperature operation:		$T_C = T_J$ = -55°C				
Gate to source voltage threshold	3403	$V_{DS} \geq V_{GS}$ I_D = 0.25 mA dc	$V_{GS(th)3}$		5.0	V dc

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4						
Switching time test	3472	I_D = rated $I_{D1;}$ V_{GS} = 10 V dc Gate drive impedance = 7.5Ω V_{DD} = 50 percent of $V_{BR(DSS)}$				
Turn-on delay time			$t_{d(on)}$			ns
2N6756, 2N6758					35	
2N6760, 2N6762					30	
Rise time			t_r			ns
2N6756, 2N6758					80	
2N6760, 2N6762					40	
Turn-off delay time			$t_{d(off)}$			ns
2N6756, 2N6758					60	
2N6760, 2N6762					80	
Fall time			t_f			ns
2N6756					45	
2N6758					40	
2N6760					35	
2N6762					30	
Subgroup 5						
Safe operating area test	3474	See figure 6; V_{DS} = 80 percent of rated $V_{BR(DSS)}$, V_{DS} = 200 V max; t_p = 10 ms				
Electrical measurements		See table I, subgroup 2				
Single pulse unclamped inductive switching	3470	See 4.3.3, c = 0, 116 devices				
Electrical measurements		See table I, subgroup 2				
Subgroup 6						
Not applicable						

See footnotes at end of table.

* TABLE I. Group A inspection - Continued.

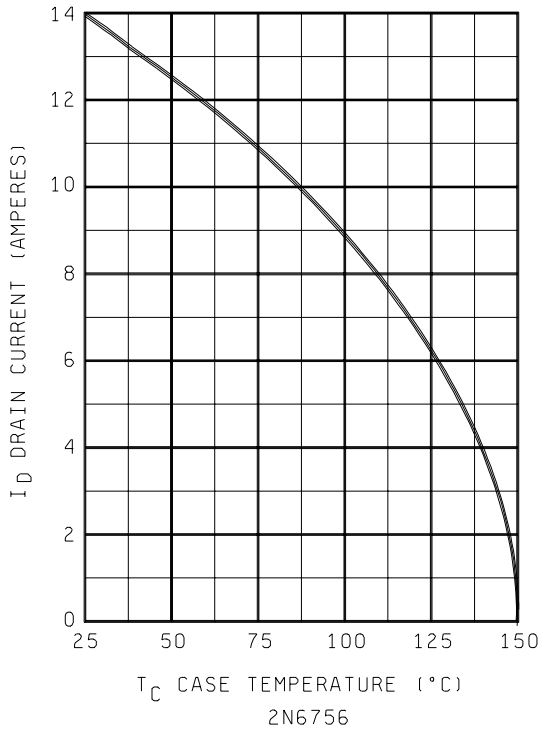
Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 7						
Gate charge	3471	Condition B				
On-state charge			$Q_{g(on)}$			nC
2N6756					35	
2N6758					39	
2N6760					39	
2N6762					40	
Gate to source charge			Q_{gs}			nC
2N6756					10	
2N6758					5.7	
2N6760, 2N6762					6.0	
Gate to drain charge			Q_{gd}			nC
2N6756					15	
2N6758					20	
2N6760					20	
2N6762					20	
Reverse recovery time	3473	di/dt = 100 A/μs $V_{DD} \leq 30$ V $I_D = I_{D1}$	t_{rr}			ns
2N6756					300	
2N6758					500	
2N6760					700	
2N6762					900	

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, subgroups 3 and 4; JAN, JANTX, and JANTXV, table VIb of MIL-PRF-19500, group B, subgroups 2 and 3; and table VII of MIL-PRF-19500, group C, subgroup 6, and table IX of MIL-PRF-19500, group E, subgroup 1.

* 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	
Subgroup 1			45 devices c = 0
Temperature cycle	1051	Condition G, 500 cycles	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table I, subgroup 2	
Subgroup 2 2/			45 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 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	
Subgroup 5			3 devices c = 0
Barometric pressure (reduced) 400 and 500 V only	1001	Test condition C $V_{ISO} = V_{DS}$ $I_{(ISO)}$ = .25 mA (max)	
Subgroup 6			3 devices
ESD	1020		
Subgroup 7			
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.



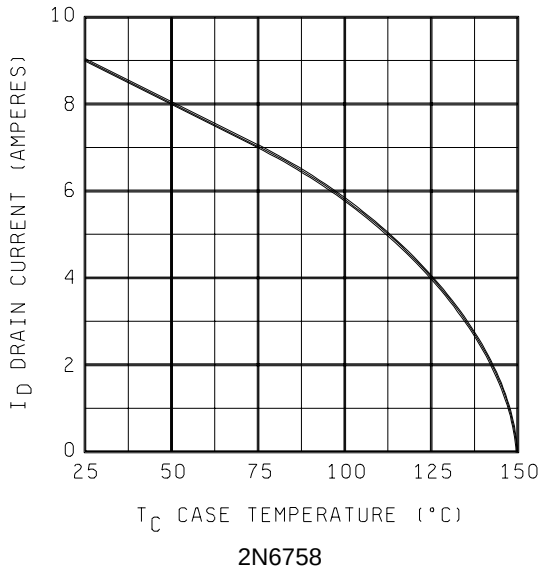
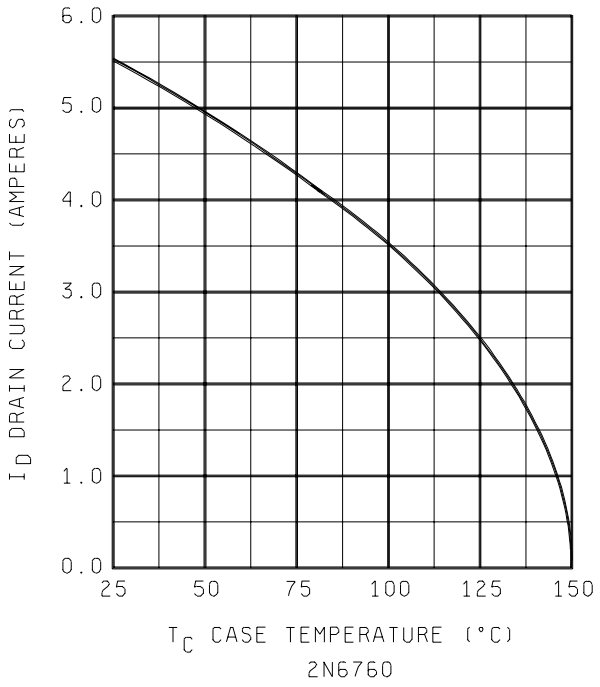


FIGURE 4. Maximum drain current vs case temperature.



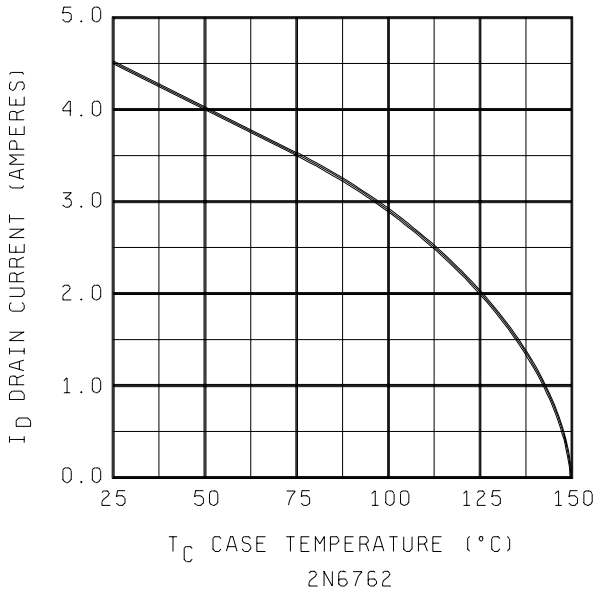
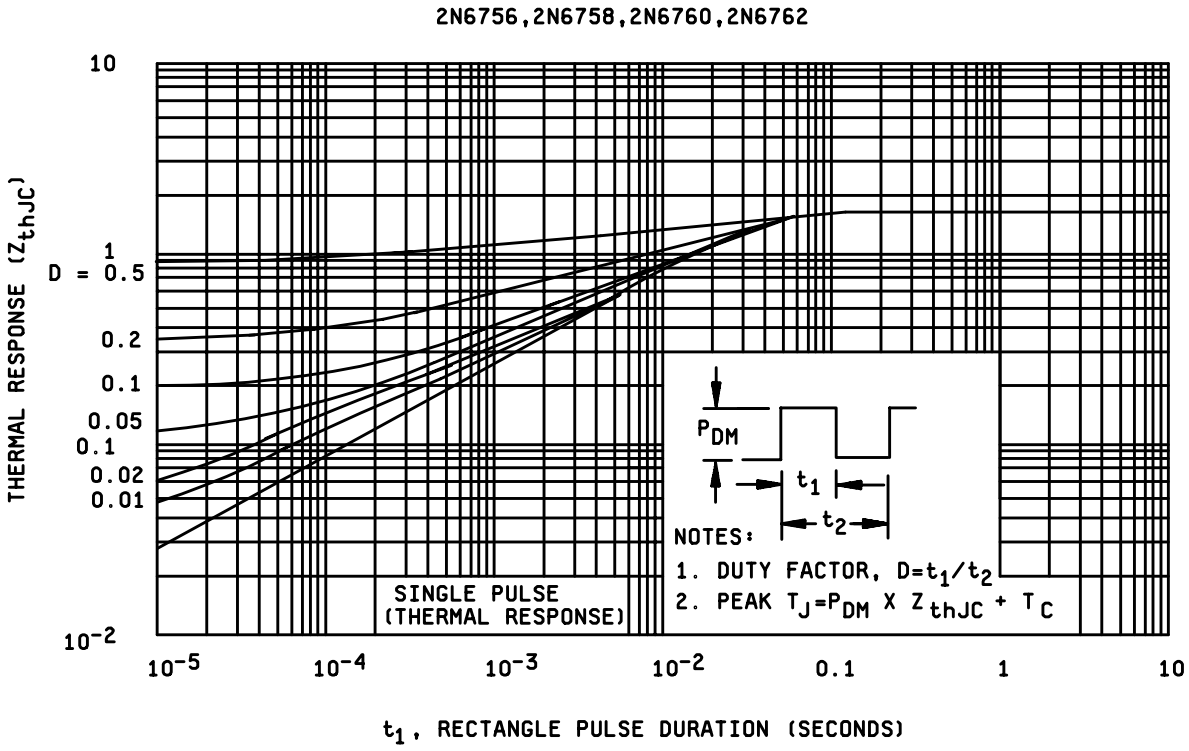
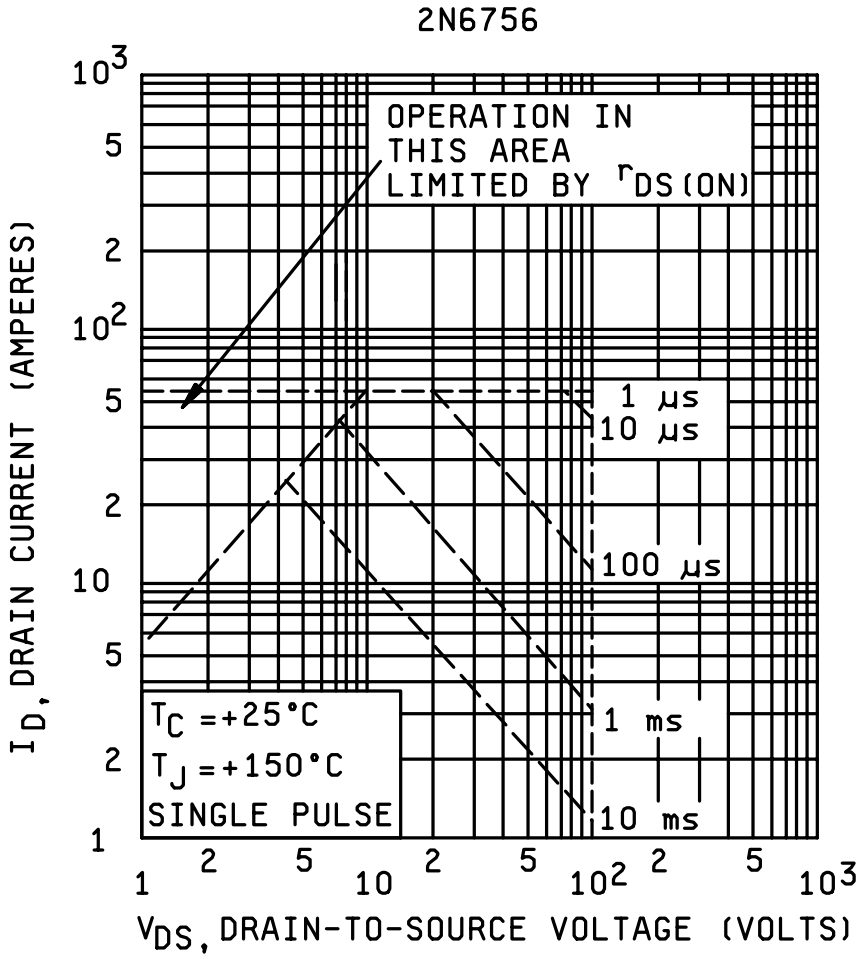


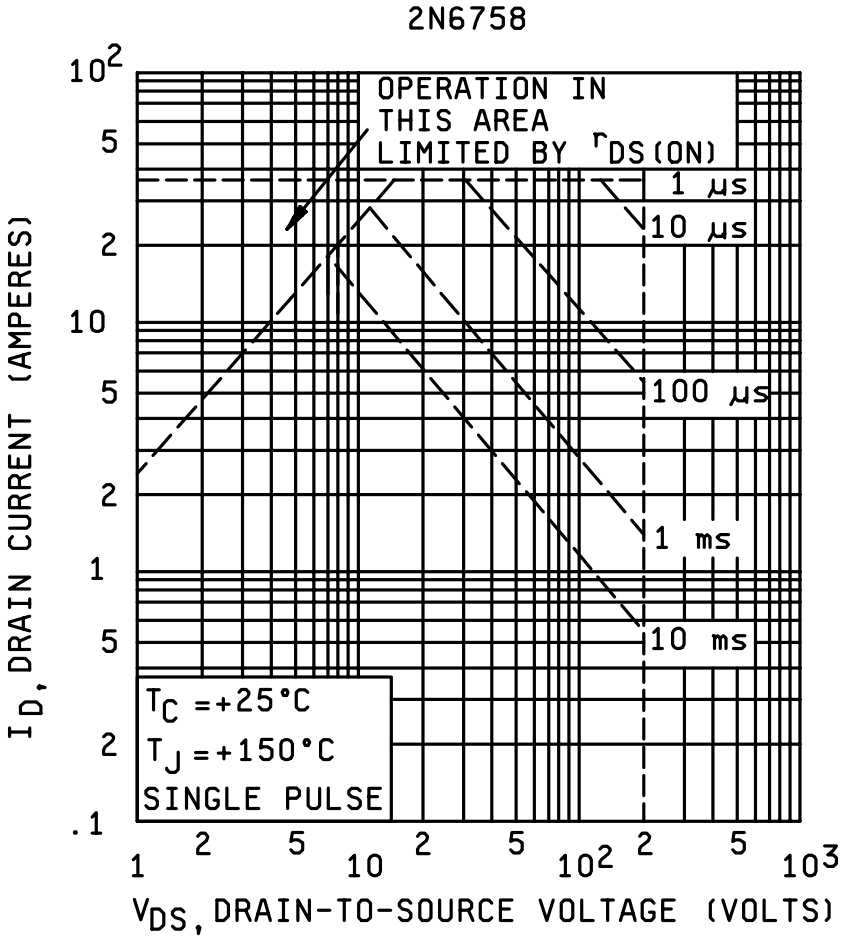
FIGURE 4. Maximum drain current vs case temperature - Continued.



* FIGURE 5. Thermal response curves.

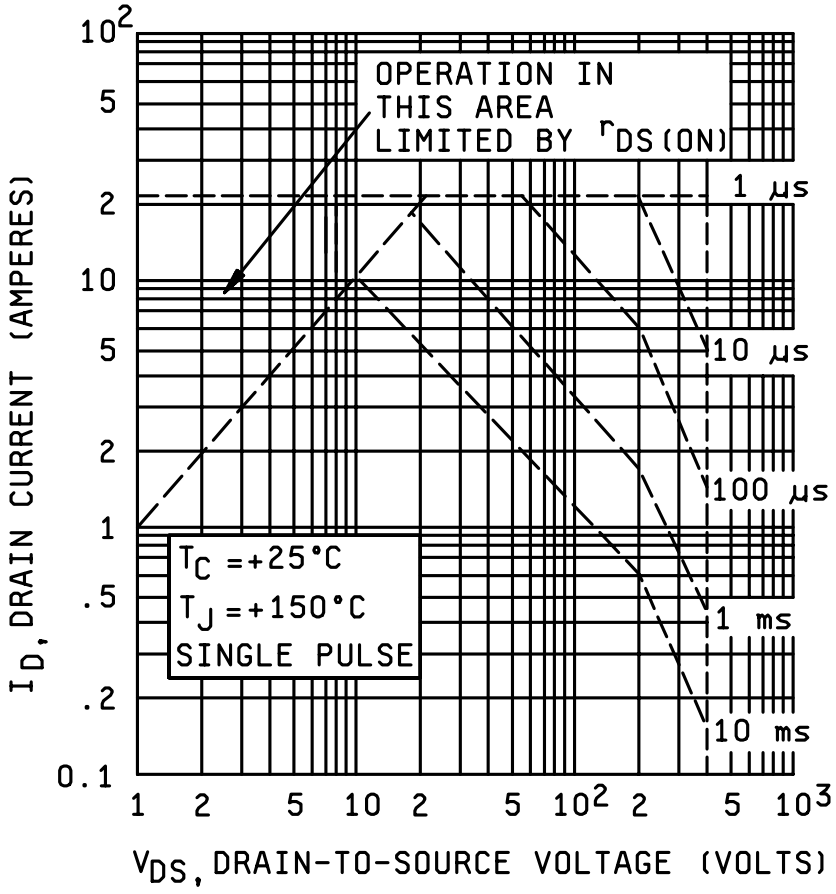


* FIGURE 6. Safe operating area.

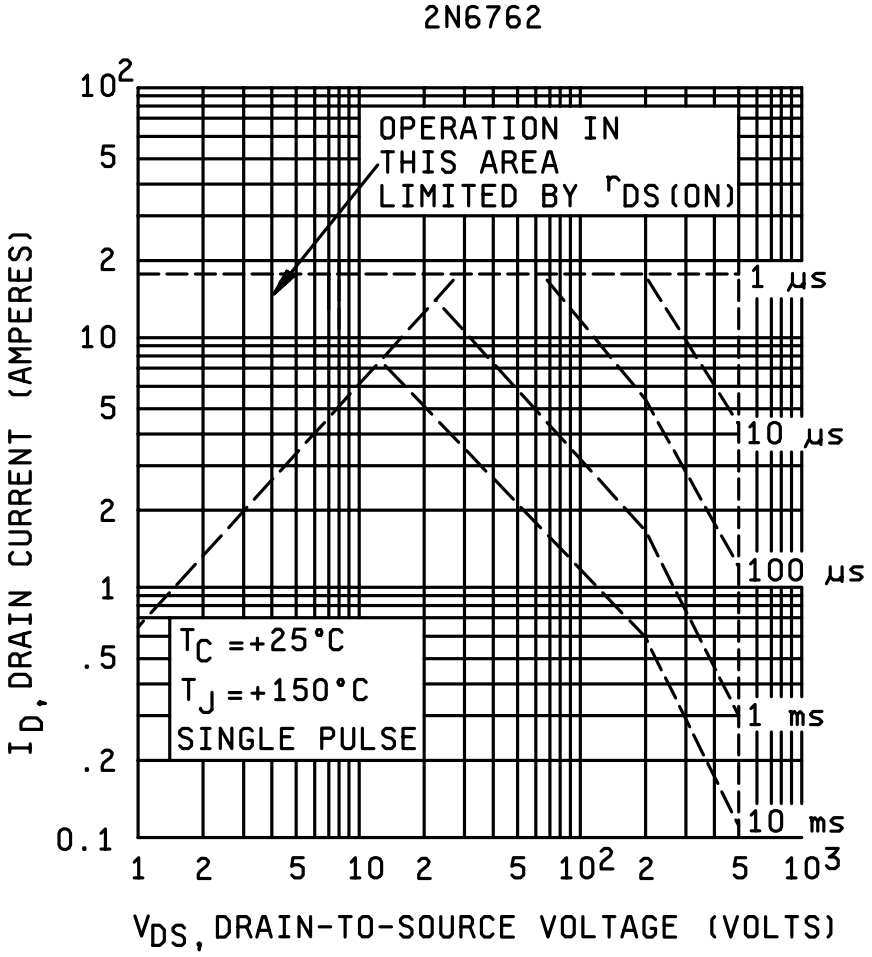


* FIGURE 6. Safe operating area - Continued.

2N6760



* FIGURE 6. Safe operating area - Continued.



* FIGURE 6. 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 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. Product assurance level and type designator.

* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers' List (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 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.

PIN	Manufacturer's CAGE code	Manufacturer's and user's PIN
2N6756	59993	IRF130
2N6758	59993	IRF230
2N6760	59993	IRF330
2N6762	59993	IRF430

6.5 Replacement data. JANTX devices shall be a direct replacement for JAN devices (example: JANTX2N6756 for JAN2N6756).

* 6.6 Suppliers of JANHC and JANKC die. The qualified die suppliers with the applicable letter version (example JANHCA2N6756) will be identified on the QML.

JANC ordering information		
PIN	Manufacturers	
	59993	18722
2N6756	JANHCA6756 JANKCA6756	JANHCB6756 JANKCB6756
2N6758	JANHCA6758 JANKCA6758	JANHCB6758 JANKCB6758
2N6760	JANHCA6760 JANKCA6760	JANHCB6760 JANKCB6760
2N6762	JANHCA6762 JANKCA6762	JANHCB6762 JANKCB6762

* 6.7 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:
Navy - TD
Air Force - 19, 70

Preparing activity:
DLA - CC

(Project 5961-2754)

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-19500/542G	2. DOCUMENT DATE 8 September 2003

3. **DOCUMENT TITLE** SEMICONDUCTOR DEVICE, TRANSISTOR, FIELD EFFECT, N-CHANNEL, SILICON, TYPES 2N6756, 2N6758, 2N6760, 2N6762, 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) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial 614-692-0510	DSN 850-0510	FAX 614-692-6939	EMAIL 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			