INCH-POUND

MIL-PRF-19500/683
9 March 2001

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, FIELD EFFECT, N-CHANNEL,
RADIATION HARDENED (TOTAL DOSE AND SINGLE EVENT EFFECTS)
TYPE 2N7467U2, JANTXVR, F, G, AND H AND JANSR, F, G, AND H

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 power MOSFET transistor with radiation hardened total dose and single event (SEE) effects ratings, with avalanche energy maximum rating (E_{AS}) and maximum avalanche current (I_{AS}). Two levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1, surface mount, U2.

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 (free air)	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}	V_{ISO} 70,000 foot altitude
	W	W	V dc	V dc	V dc	A dc	A dc	A dc	A(pk)	°C	V dc
2N7467U2	250	2.5	30	30	±20	75	45	75	300	-55 to +150	N/A

(1) Derate linearly 2.0 W/°C for T_C > +25°C.
(2) ID limited by internal bond wires.

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, P.O. 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.

AMSC N/A FSC 5961

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

Type	Min $V_{(BR)DSS}$ V_{GS} = 0 I_D = 1.0 mA dc	$V_{GS(TH)}$ $V_{DS} \geq V_{GS}$ I_D = 1.0 mA dc		Max I_{DSS1} V_{GS} = 0 V_{DS} = 80 percent of rated V_{DS}	Max $r_{DS(ON)}$ (1) V_{GS} = 12 V dc		$R_{\theta JC}$ max	E_{AS} at I_{D1}	I_{AS}
					T_J = 25°C at I_{D2}	T_J = 150°C at I_{D2}			
	V dc	V dc		µA dc	ohm	ohm	°C/W	mJ	A
		Min	Max						
2N7467U2	30	2.0	4.0	10	.0035	.006	.50	500	75

(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.

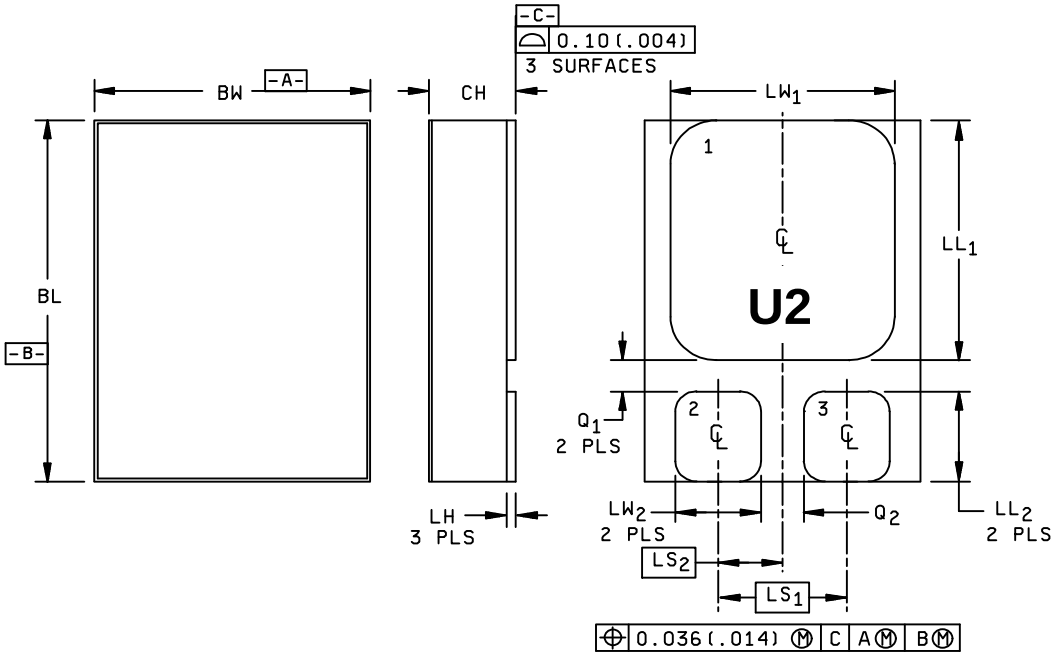
STANDARD

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.



LTR	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.684	.696	17.38	17.67
BW	.519	.531	13.19	13.48
CH	---	.142	---	3.60
LL1	.469	.481	11.92	12.21
LL2	.151	.163	3.84	4.14
LH	.010	.020	.254	.508
LS1	.240		6.10	
LS2	.120		3.05	
LW1	.434	.446	11.03	11.32
Q1	.035	---	.89	---
Q2	.050	---	1.27	---
LW2	.134	.146	3.41	3.70

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions and tolerancing shall be in accordance with ANSI Y14.5M-1982.
4. Terminal 1 – Drain, Terminal 2 – Gate, Terminal 3 – Source

FIGURE 1. Physical dimensions for surface mount - U2.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

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 and as follows: I_{AS} - rated avalanche current, nonrepetitive.

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-19500 and figure 1 (U2) herein. Methods used for the electrical isolation of the terminals shall employ materials that contain a minimum of 90 percent Al_2O_3 (ceramic).

3.4.1 Lead material and finish. Terminal material shall be copper tungsten. Terminal finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of terminal finish is desired, it shall be specified in the acquisition document (see 6.5).

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.

3.6 Electrostatic discharge protection. The devices covered by this specification require electrostatic discharge protection.

3.6.1 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 3.6).

a. Devices should 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 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.

3.7 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 as specified in table I, group A 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 tables I, II and III and 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with MIL-PRF-19500 and table III herein. End-point electrical measurements shall be in accordance with the applicable tests of table I, group A, subgroup 2 herein.

4.2.1.1 SEE. Design capability shall be tested on the initial qualification and thereafter whenever a major die design or process change is introduced. See the design safe operation area graph shown herein. End-point measurements shall be in accordance with table III.

4.3 Screening (JANS, JANTX and JANTXV levels only). Screening shall be in accordance with appendix E, table IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see appendix E, table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTXV level
(1)	Method 3470, E_{AS} (see 4.5.4).	Method 3470, E_{AS} (see 4.5.4).
(1) 3c	Method 3161, thermal impedance (see 4.5.3).	Method 3161, thermal impedance (see 4.5.3).
(1)	Gate stress test (see 4.5.5).	Gate stress test (see 4.5.5).
(1) 9	Subgroup 2 of table I herein; I_{GSSF1}, I_{GSSR1}, I_{DSS1}.	Not applicable.
10	MIL-STD-750, method 1042, test condition B.	MIL-STD-750, method 1042, test condition B.
11	Subgroup 2 of table I herein; I_{GSSF1}, I_{GSSR1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(TH)1}$. 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} = ± 5 µA dc or ± 100 percent of initial value, whichever is greater.	Subgroup 2 of table I herein; I_{GSSF1}, I_{GSSR1}, I_{DSS1}, $r_{DS(on)1}$, $V_{GS(TH)1}$.

Screening table, continued:

Screen (see appendix E, table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTXV level
12	Method 1042 of MIL-STD-750, test condition A.	Method 1042 of MIL-STD-750, test condition A
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} = ± 5 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.	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} = ± 5 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) Shall be performed anytime before screen 10.

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. End-point electrical measurements shall be in accordance with 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 appendix E, table VIa (JANS) and table VIb (JANTX and JANTXV) of MIL-PRF-19500, and as specified herein. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein.

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

Subgroup	Method	Condition
B3	1051	Test condition G, 100 cycles.
B3	2075	See 3.4.2.
B3	2037	Test condition A, all internal wires for each device shall be pulled separately.
B3	2077	Scanning electron microscope (SEM) qualification may be performed anytime prior to lot formation.
B4	1042	Condition D, 2,000 cycles. Neither heat sink nor forced-air cooling on the device shall be permitted during the on cycle. The heating cycle shall be 60 seconds minimum.
B5	1042	Test condition B, V_{GS} = rated; T_A = +175°C, t = 24 hours.
B5	1042	Condition A, V_{DS} = rated; T_A = 175°C; t = 120 hours.
B5	2037	Not applicable.
B6	3161	Not applicable.

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

Subgroup	Method	Condition
B2	1051	Test condition G, 25 cycles. (45 total, including 20 cycles performed in screening).
B3	1042	Test condition D, 2,000 cycles. Neither heat sink nor forced-air cooling on the device shall be permitted during the on cycle. The heating cycle shall be 60 seconds minimum.
B3	2037	Test condition A. All internal bond wires for each device shall be pulled separately.
B4	2075	See 3.4.2.
B4	2077	Not applicable.
B5 and B6		Not applicable.

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

Subgroup	Method	Condition
C2	1056	Test condition B.
C2	1021	Omit initial conditioning.
C5	3161	See 4.5.2
C6	1042	Test condition D, 6,000 cycles. Neither heat sink nor forced-air cooling on the device shall be permitted during the on cycle. The heating cycle shall be 60 seconds minimum.
C6	2037	Test condition A. All internal bond wires for each device shall be pulled separately. (Wire bond pull test performed if devices continued from group B.)
C7	1018	No pre-bake required.

4.4.4 Group D Inspection. Group D inspection shall be conducted in accordance with appendix E, table VIII of MIL-PRF-19500 and table II 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. The maximum limit of $R_{\theta JC(max)}$ = 0.50°C/W. The following parameter measurements shall apply:

a. Measuring current (I_M): 10 mA.

b. Drain heating current (I_H): 20A.

c. Heating time (t_H): Steady-state (see method 3161 of MIL-STD-750).

d. Drain-source heating voltage (V_H): 20 V.

e. Measurement time delay (t_{MD}): 30 µs to 60 µs.

f. Sample window time (t_{SW}): 10 µs maximum.

4.5.3 Thermal impedance ($Z_{\theta JC}$ measurements). The $Z_{\theta JC}$. measurements shall be performed in accordance with method 3161 of MIL-STD-750. The maximum limit (not to exceed the thermal impedance curves (see figure 2 herein) shown and the group A, subgroup 2 limits) for $Z_{\theta JC}$ in screening (appendix E, 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 capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X, R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for Engineering evaluation and disposition. This procedure may be used in lieu of an in line procedure.

a. Measuring current (I_M): 10 mA.

b. Drain heating current (I_H): 20 A minimum.

c. Heating time (t_H): 20 ms.

d. Drain-source heating voltage (V_H): 20 V.

e. Measurement time delay (t_{MD}): 30 µs to 60 µs.

f. Sample window time (t_{SW}): 10 µs maximum.

4.5.4 Single pulse avalanche energy (E_{AS}).

a. Peak current (I_{AS}): $I_{AS(max)}$.

b. Peak gate voltage (V_{GS}): 12 V.

c. Gate to source resistor (R_{GS}): $25\Omega \leq R_{GS} \leq 200\Omega$.

d. Initial case temperature (T_C): +25°C +10°C, -5°C.

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

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

g. Supply voltage (V_{DD}): 20 V.

4.5.5 Gate stress test.

a. V_{GS} = 24 V minimum.

b. t = 250 µs minimum.

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 impedance 2/	3161	See 4.5.3	$Z_{\theta JC}$		0.37	°C/W
Breakdown voltage, drain to source	3407	V_{GS} = 0 V dc, I_D = 1 mA dc, bias condition C	$V_{(BR)DSS}$	30		V dc
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$ I_D = 1 mA dc	$V_{GS(TH)1}$	2.0	4.0	V dc
Gate current	3411	V_{GS} = +20 V dc and -20 V dc, bias condition C, V_{DS} = 0	$I_{GSS(TH)1}$		± 100	nA dc
Drain current	3413	V_{GS} = 0 V dc, bias condition C, V_{DS} = 24 V dc	I_{DSS1}		10	µA dc
Static drain to source on-state resistance	3421	V_{GS} = 12 V dc, condition A, pulsed (see 4.5.1), $I_D = I_{D2}$	$r_{DS(on)1}$		.0035	ohm
Forward voltage	4011	Pulsed (see 4.5.1), $I_D = I_{D2}$, V_{GS} = 0 V dc	V_{SD}		1.3	V
Subgroup 3						
High-temperature operation:		$T_C = T_J$ = +125°C				
Gate current	3411	V_{GS} = +20 V dc and -20 V dc, bias condition C, V_{DS} = 0	I_{GSS2}		± 200	nA dc
Drain current	3413	V_{GS} = 0 V dc, bias condition C, V_{DS} = 24 V dc	I_{DSS2}		25	µA dc
Static drain to source on-state resistance	3421	V_{GS} = 12 V dc, pulsed (see 4.5.1), $I_D = I_{D2}$	$r_{DS(on)3}$		.0055	ohm
Gate to source voltage (thresholds)	3403	$V_{DS} \geq V_{GS}$, I_D = 1 mA dc	$V_{GS(TH)2}$	1.5		V dc
Low-temperature operation:		$T_C = T_J$ = -55°C				
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$, I_D = 1 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						
Forward transconductance	3475	I_D = rated I_{D2}, V_{DD} = 15 V (see 4.5.1)	g_{FS}	45		
Switching time test	3472	$I_D = I_{D2}$, V_{GS}= 12 V dc, R_G = 2.35Ω, V_{DD} = 15 V dc				
Turn-on delay time			$t_{d(on)}$		35	35
Rise time			t_r		125	125
Turn-off delay time			$t_{d(off)}$		80	80
Fall time			t_f		50	50
Subgroup 5						
Safe operating area test (high voltage)	3474	See figure 3; t_p = 10 ms V_{DS} = 24 V				
Electrical measurements		See table I, subgroup 2 herein.				
Subgroup 6						
Not applicable						
Subgroup 7						
Gate charge	3471	Condition B $I_D = I_{D2}$				
On-state gate charge			$Q_{G(on)}$		200	nC
Gate to source charge			Q_{GS}		55	nC
Gate to drain charge			Q_{GD}		40	nC
Reverse recovery time	3473	$d_i/d_t \leq 100$ A/µs, $V_{DD} \leq 25$ V, $I_D = I_{D2}$	t_{rr}		165	ns

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):
Group B, subgroups 3 and 4 (JANS) or group B, subgroups 2 and 3 (JANTX and JANTXV).
Group C, subgroup 6.
Group E, subgroup 1.

TABLE II. Group D inspection.

Inspection 1/ 2/ 3/	MIL-STD-750		Symbol	Preirradiation limits		Postirradiation limits				Unit
	Method	Conditions		R, F, G AND H		R, F AND G		H		
				Min	Max	Min	Max	Min	Max	
Subgroup 1										
Not applicable										
Subgroup 2		T_C = +25°C								
Steady-state total dose irradiation (V_{GS} bias) 4/	1019	V_{GS} = 12V V_{DS} = 0								
Steady-state total dose irradiation (V_{DS} bias) 4/	1019	V_{GS} = 0 V_{DS} = 80 percent of rated V_{DS} (pre-irradiation)								
End-point electricals										
Breakdown voltage, drain to source	3407	V_{GS} = 0 I_D = 1 mA Bias condition C	$V_{(BR)DSS}$	30		30		30		V dc
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$	V_{GSth1}	2.0	4.0	2.0	4.0	1.5	4.0	V dc
Gate current	3411	V_{GS} = 20 V V_{DS} = 0 Bias condition C	I_{GSSF1}		100		100		100	nA dc
Gate current	3411	V_{GS} = -20 V V_{DS} = 0 Bias condition C	I_{GSSR1}		-100		-100		-100	nA dc
Drain current	3413	V_{GS} = 0 Bias condition C V_{DS} = 80 percent of rated V_{DS} (pre-irradiation)	I_{DSS1}		10		10		10	µA dc

See footnotes at end of table.

TABLE II. Group D inspection - Continued.

Inspection 1/ 2/ 3/	MIL-STD-750		Symbol	Preirradiation limits		Postirradiation limits				Unit
	Method	Conditions		R, F, G AND H		R, F AND G		H		
				Min	Max	Min	Max	Min	Max	
Static drain to source on-state voltage 5/	3405	V_{GS} = 12 V Condition A pulsed (see 4.5.1) $I_D = I_{D2}$	V_{Dson1}		.180		.180		.2025	V dc
Static drain to source on-state voltage	3405	V_{GS} = 12 V Condition A pulsed (see 4.5.1) $I_D = I_{D2}$	V_{Dson1}		.1575		.1575		.180	V dc
Forward voltage source to drain diode	4011	V_{GS} = 0 $I_D = I_{D2}$	V_{SD}		1.3		1.3		1.3	V dc

1/ For sampling plan, see MIL-PRF-19500.
2/ Group D qualification may be performed anytime prior to lot formation. Wafers qualified to these group D QCI requirements may be used for any other detail specification utilizing the same die design.
3/ At the manufacturer's option, group D samples need not be subjected to the screening tests, and may be assembled in its' qualified package or in any qualified package that the manufacturer has data to correlate the performance to the designated package.
4/ Separate samples shall be pulled for each bias.
5/ Limit using TO-204AE package. The higher package resistance necessitates the higher V_{DSon1} limit when the manufacturer uses the alternate package as allowed in 4/ above.

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

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method	Conditions	
Subgroup 1			12 devices c = 0
Thermal shock (temperature cycling)	1051	Test condition G, 500 cycles.	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table I, group A, subgroup 2.	
Subgroup 2 1/			12 devices c = 0
Steady-state reverse bias	1042	Condition B, 1,000 hours.	
Electrical measurements		See table I, group A, subgroup 2.	
Steady-state gate bias	1042	Condition A, 1,000 hours.	
Electrical measurements		See table I, group A, subgroup 2.	
Subgroup 3			
Not applicable			
Subgroup 4			22 devices c = 0
Thermal resistance	3161	$R_{\theta JC}$ = 0.50 °C/W maximum. See 4.5.2.	
Subgroup 5			
Not applicable			
Subgroup 6			3 devices
ESD	1020		
Electrical measurements		See table I, group A, subgroup 2.	

See footnotes at end of table.

TABLE III. Group E inspection (all quality levels) for qualification only - Continued.

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method	Conditions	
Subgroup 7			3 devices
SEE 2/ 3/ 4/	1080	See figure 4.	
Electrical measurements 5/		IGSS1 and IDSS1 in accordance with table I, group A, subgroup 2	
SEE irradiation		Fluence = 3E5 ± 20% ions/cm^2 Flux = 2E3 to 2E4 ions/cm^2/sec Temperature = 25 ± 5 °C (ION – BROMINE) LET = 37.3 MeV-cm^2/mg Range = 36.8 microns Energy = 285 MeV Insitu bias conditions: VDS = 30V & VGS = -10V VDS = 22.5V & VGS = -15V VDS = 15V & VGS = -20V (ION – IODINE) LET = 59.8 MeV-cm^2/mg Range = 32.6 microns Energy = 343 MeV Insitu bias conditions: VDS = 25V & VGS = -5V VDS = 20V & VGS = -10V VDS = 15V & VGS = -15V VDS = 7.5V & VGS = -20V	
Electrical measurements 5/		IGSS1 and IDSS1 in accordance with table I, group A, subgroup 2	

1/ A separate sample for each test shall be pulled.
2/ Group E qualification of SEE testing may be performed prior to lot formation. Qualification may be extended to other performance specifications utilizing the same structurally identical die design.
3/ Device qualification to a higher level LET is sufficient to qualify all lower level LET's.
4/ The sampling plan applies to each bias condition.
5/ Examine IGSS1 and IDSS1 before and following SEE irradiation to determine acceptability for each bias condition. Other test conditions in accordance with table I, group A, subgroup 2 herein, may be performed at the manufacturer's option.

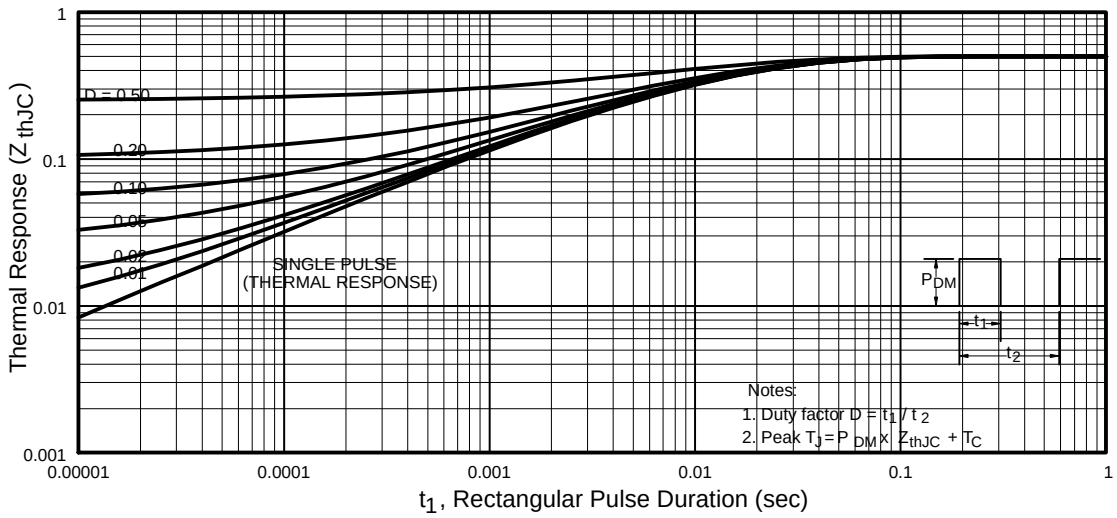


FIGURE 2. Thermal impedance curves.

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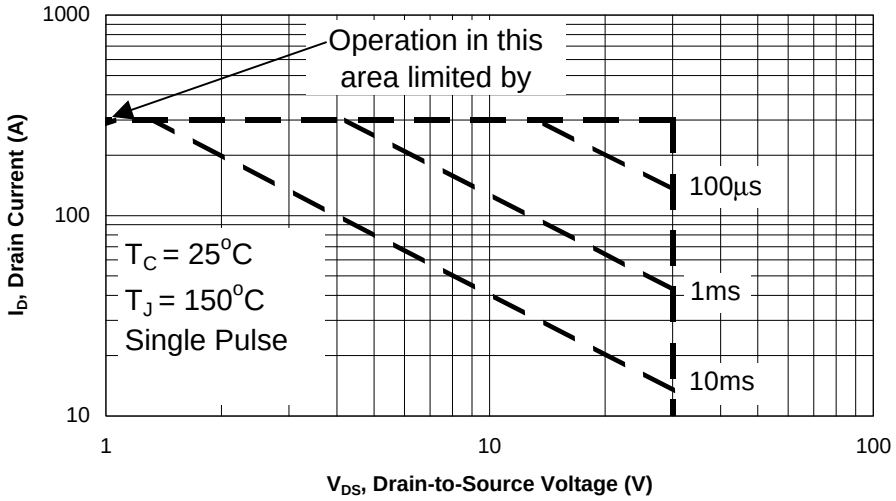

FIGURE 3. Safe operating area graph.

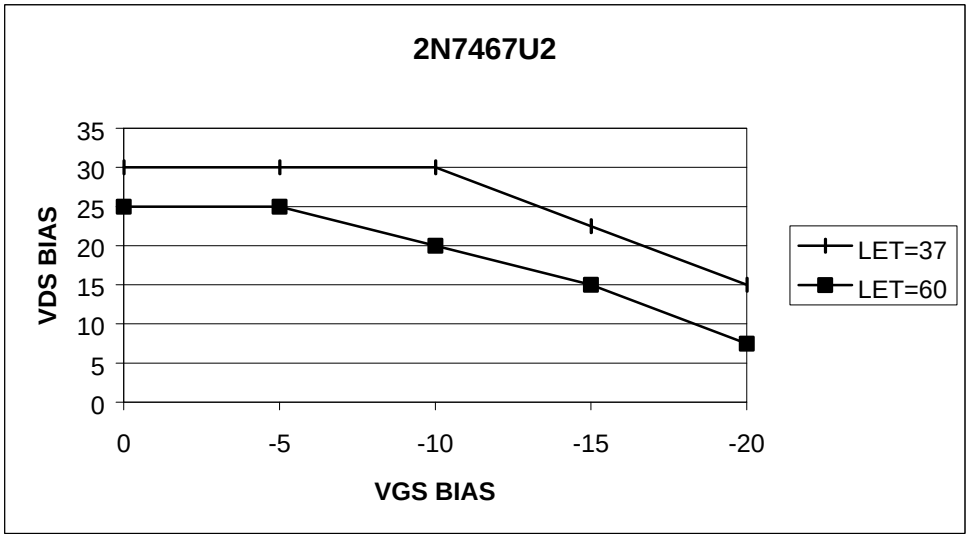

FIGURE 4. SEE safe operation area graph.

5. PACKAGING

5.1 Packaging. Packaging shall prevent mechanical damage of the devices during shipping and handling and shall not be detrimental to the device. 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 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.

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. The acquisition requirements are as specified in MIL- PRF-19500.

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 Products List QPL No.19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC-VQE, P.O. Box 3990, Columbus, OH 43216-5000.

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

Preferred types	Commercial types
2N7467U2	IRHNA57Z60

6.5 Ordering data. Acquisition documents may specify the material and finish (see 3.4.1).

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

Preparing activity:
DLA - CC

(Project 5961-2312)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/683	2. DOCUMENT DATE 9 March 2001

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, FIELD EFFECT, N-CHANNEL, RADIATION HARDENED (TOTAL DOSE AND SINGLE EVENT EFFECTS) TYPE 2N7467U2, JANTXVR F, G, AND H AND JANSR, F, G, AND H

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 (PLEASE PRINT)	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. NAME Alan Barone	b. TELEPHONE Commercial 614-692-0510 DSN 850-0510 FAX 614-692-6939 EMAIL alan.barone@dscc.dla.mil
c. ADDRESS *(Include Zip Code)* 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 Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703)767-6888 DSN 427-6888