

The documentation and process conversion measures necessary to comply with this revision shall be completed by 29 November 2011.

INCH-POUND

MIL-PRF-19500/547D
29 August 2011
SUPERSEDING
MIL-PRF-19500/547C
24 June 2009

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, FIELD EFFECT TRANSISTOR, N-CHANNEL,
SILICON, TYPES 2N6660 AND 2N6661,
JAN, JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and [MIL-PRF-19500](#).

1. SCOPE

1.1 Scope. This specification covers the performance requirements for a N-channel, enhancement-mode, low-threshold logic level, high frequency, high switching speed MOSFET, power transistor. Four levels of product assurance are provided for each encapsulated device type as specified in [MIL-PRF-19500](#).

1.2 Physical dimensions. See [figure 1](#) (TO-205AD).

* 1.3 Maximum ratings. Unless otherwise specified, $T_A = +25^\circ\text{C}$.

Type	P_T (1) $T_C = +25^\circ\text{C}$	P_T $T_A = +25^\circ\text{C}$	$R_{\theta JC}$	V_{DS}	V_{DGR}	V_{GS}	I_{D1} (3) $T_C = +25^\circ\text{C}$	I_{D2} (3) $T_C = +100^\circ\text{C}$	I_S	I_{DM}	T_J and T_{STG}
	<u>W</u>	<u>mW</u>	<u>$^\circ\text{C/W}$</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>A dc</u>	<u>A dc</u>	<u>A (pk)</u>	<u>$^\circ\text{C}$</u> -65 to +150
2N6660	6.25	725	20	60	60	± 20	0.99	0.62	-0.99	3	
2N6661	6.25	725	20	90	90	± 20	0.86	0.54	-0.86	3	

(1) Derate linearly by 0.05 W/ $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.

(2) $R_{GS} \leq 1$ M ohm.

* (3) The following formula derives the maximum theoretical I_D limit. I_D is limited by package and internal construction.

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

* Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil/>.

MIL-PRF-19500/547D

1.4 Primary electrical characteristics. $T_C = +25^\circ\text{C}$ unless otherwise noted.

Type	Min $V_{(BR)DSS}$ $V_{GS} = 0\text{ V}$ $I_D = 10\ \mu\text{A dc}$	$V_{GS(th)1}$ $V_{DS} \geq V_{GS}$ $I_D = 1.0\ \text{mA dc}$		Max I_{DSS1} $V_{GS} = 0\ \text{V}$	Max $r_{DS(on)1}$ $V_{GS} = 10\ \text{V dc}$	
				$V_{DS} = 80$ percent of rated V_{DS}	$T_J = +25^\circ\text{C}$ at I_{D1}	$T_J = +150^\circ\text{C}$ at I_{D2}
	<u>V dc</u>	<u>V dc</u> Min Max		<u>$\mu\text{A dc}$</u>	<u>Ohm</u>	<u>Ohm</u>
2N6660	60	0.8	2.0	1.0	3.0	6.33
2N6661	90	0.8	2.0	1.0	4.0	8.44

(1) Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-PRF-19500](#) - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-750](#) - Test Methods for Semiconductor Devices.

* (Copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch/> or <https://assist.daps.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

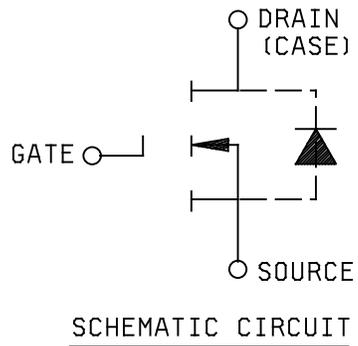
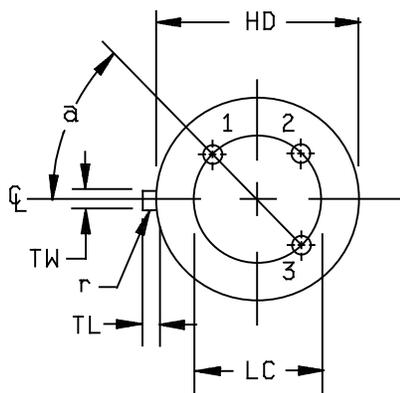
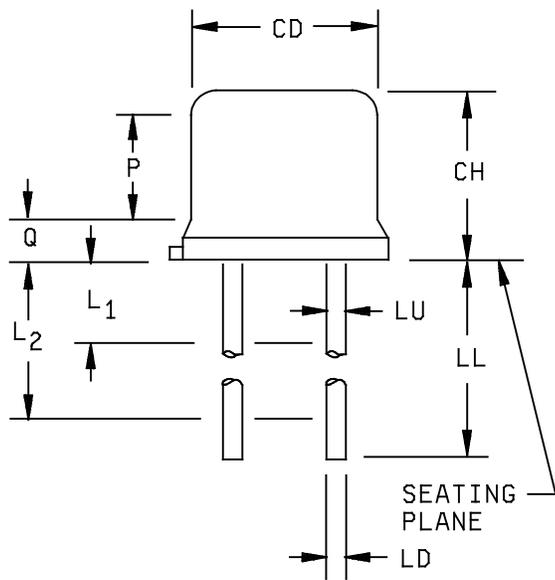


FIGURE 1. Physical dimensions (TO-205AD).

MIL-PRF-19500/547D

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
TW	.028	.034	0.71	0.86	2
TL	.029	.045	0.74	1.14	3
LD	.016	.021	0.41	0.53	7,8
LL	.500	.750	12.70	19.05	7,8
LC	0.200 TP		5.08 TP		6
LU	.016	.019	0.41	0.48	7,8
L ₁		.050		1.27	7,8
L ₂	.250		6.35		7,8
P	.100		2.54		5
Q		.050		1.27	4
R		.010		0.25	9
α	45° TP		45° TP		6

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Beyond radius (r) maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
3. Dimension TL measured from maximum HD.
4. Outline in this zone is not controlled.
5. Dimension CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
6. 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.
7. LU applies between L₁ and L₂. LD applies between L₂ and L minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
8. All three leads.
9. Radius (r) applies to both inside corners of tab.
10. Drain is electrically connected to the case.

FIGURE 1. Physical dimensions(TO-205AD) - Continued.

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](#).

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-19500](#) and on [figure 1](#) (TO-205AD) herein.

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

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

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 protection.

3.6.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of static 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, $R \leq 100 \text{ k}\Omega$, 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 paragraph [1.3](#), [1.4](#) and [table I](#).

3.8 Electrical test requirements. The electrical test requirements shall be as specified in [table I](#).

3.9 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).
- c. Conformance inspection (see 4.4 and table I).

* 4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and herein. Alternate flow is allowed for qualification inspection in accordance with MIL-PRF-19500.

4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

* 4.3 Screening (JANS, JANTX and JANTXV levels only). Screening shall be in accordance with table E-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 E-IV of MIL-PRF-19500) (1) (2)	Measurement	
	JANS level	JANTX and JANTXV levels
(3)	Gate stress test (see 4.3.2)	Gate stress test (see 4.3.2)
(3) 3c	Method 3161 of MIL-STD-750, thermal impedance (see 4.3.2)	Method 3161 of MIL-STD-750, thermal impedance (see 4.3.2)
9	Subgroup 2 of table I herein. I_{DSS1} , I_{GSSF1} , I_{GSSR1} .	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. $\Delta I_{GSSF1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 20$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 10$ μ A dc or ± 100 percent of initial value, whichever is greater.	I_{GSSF1} , I_{GSSR1} , I_{DSS1} , $r_{DS(on)1}$, $V_{GS(TH)1}$. Subgroup 2 of table I herein.
12	Method 1042 of MIL-STD-750, test condition A.	Method 1042 of MIL-STD-750, test condition A.
13	Subgroups 2 and 3 of table I herein. $\Delta I_{GSSF1} = \pm 10$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 10$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 1$ μ A dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1} = \pm 20$ percent of initial value or ± 0.5 ohm, whichever is greater. $\Delta V_{GS(th)1} = \pm 10$ percent of initial value or ± 0.3 V dc.	Subgroup 2 of table I herein. $\Delta I_{GSSF1} = \pm 10$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{GSSR1} = \pm 10$ nA dc or ± 100 percent of initial value, whichever is greater. $\Delta I_{DSS1} = \pm 1$ μ A dc or ± 100 percent of initial value, whichever is greater. $\Delta r_{DS(on)1} = \pm 20$ percent of initial value or ± 0.5 ohm, whichever is greater. $\Delta V_{GS(th)1} = \pm 10$ percent of initial value or ± 0.3 V dc.

- (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 after temperature cycling, screen 3a; JANTX and JANTXV levels do not need to be repeated in screening requirements.

* 4.3.1 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3161 of [MIL-STD-750](#) using the guidelines in that method for determining I_M , I_H , t_H , t_{SW} , (and V_H where appropriate). Measurement delay time (t_{MD}) = 70 μ s max. See table II, group E, subgroup 4 herein.

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

* 4.4 Conformance inspection. Conformance inspection shall be 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](#), 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 E-VIA (JANS) and table E-VIB (JAN, JANTX, and JANTXV) of [MIL-PRF-19500](#), and herein. End-point electrical measurements shall be in accordance with [table I](#), subgroup 2 herein.

4.4.2.1 Group B inspection table E-VIA (JANS) of [MIL-PRF-19500](#).

Subgroup	Method	Conditions
B3	1051	Test condition G.
B4	1042	Test condition D; 2,000 cycles. The heating cycle shall be 1 minute minimum. $V_{DS} = 10$ V dc, $P_T =$ See 1.4 at $T_A = +25^\circ\text{C} \pm 3^\circ\text{C}$.
B5	1042	Accelerated steady-state operation life; test condition C; $T_A = + 25^\circ\text{C}, - 5^\circ\text{C}, + 10^\circ\text{C}$, $V_{DS} = 10$ V min.; I_D adjusted to meet a junction temperature of $140^\circ\text{C}, - 0^\circ\text{C}, + 10^\circ\text{C}$, $t = 240$ hours.
B5	2037	Bond strength (Al-Au die interconnects only); test condition D.

* 4.4.2.2 Group B inspection, table E-VIB (JAN, JANTX, and JANTXV) of [MIL-PRF-19500](#).

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B2	1051	Test condition G, 25 cycles.
* B3	1042	Intermittent operation life, condition D, 2,000 cycles . No heat sink or forced air cooling on the device shall be permitted during the on cycle; $t_{on} = 30$ seconds minimum.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Test condition E .
C5	3161	Thermal resistance, see 4.5.2, $R_{\theta JC(max)} = 20^{\circ}C/W$.
* C6	1042	Intermittent operation life, condition D, 6,000 cycles . No heat sink or forced air cooling on the device shall be permitted during the on cycle; $t_{on} = 30$ seconds minimum.

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-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. The thermal resistance measurements shall be performed in accordance with method 3161 of [MIL-STD-750](#) using the guidelines in that method for determining I_M , I_H , t_H , t_{SW} (and V_H where appropriate). Measurement delay time (t_{MD}) = 70 μs max. See table E-IX of [MIL-PRF-19500](#), group E, subgroup 4.

TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u> Visual and mechanical Inspection	2071					
<u>Subgroup 2</u> Thermal impedance <u>2/</u>	3161	See 4.3.1	$Z_{\theta JC}$			°C/W
Breakdown voltage, drain to Source 2N6660 2N6661	3407	Bias condition C; $V_{GS} = 0$ V; $I_D = 1.0$ μ A dc	$V_{(BR)DSS}$	60 90		
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$; $I_D = 1.0$ mA dc	$V_{GS(th)1}$	0.8	2.0	V dc
Gate current	3411	Bias condition C; $V_{DS} = 0$ V; $V_{GS} = +20$ V dc	I_{GSSF1}		+100	nA dc
Gate current	3411	Bias condition C; $V_{DS} = 0$ V; $V_{GS} = -20$ V dc	I_{GSSR1}		-100	nA dc
Drain current	3413	$V_{GS} = 0$; bias condition C; $V_{DS} = 80$ percent of rated V_{DS} (see 1.3)	I_{DSS1}		1.0	μ A dc
Static drain to source on-state resistance 2N6660 2N6661	3421	$V_{GS} = 10$ V dc; condition A; pulsed (see 4.5.1); $I_D = 1.0$ A dc	$r_{DS(on)1}$		3.0 4.0	ohms ohms
Static drain to source on-state resistance 2N6660 2N6661	3421	$V_{GS} = 5$ V dc; condition A; pulsed (see 4.5.1); $I_D = 0.3$ A dc	$r_{DS(on)2}$		5.0 5.3	ohms ohms
Forward voltage (source drain diode) 2N6660 2N6661	4011	Pulsed (see 4.5.1); $V_{GS} = 0$ V $I_S = 0.99$ A dc $I_S = 0.86$ A dc	V_{SD}	0.7 0.7	1.6 1.4	V(pk) V(pk)

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> – Continued.						
Forward transconductance	3475	Pulsed (see 4.5.1), $V_{DS} = V_{GS} = 7.5$ V dc	g_{FS}	170		ms
2N6660 2N6661		$I_{D1} = 525$ m A dc $I_{D2} = 475$ m A dc				
<u>Subgroup 3</u>						
High temperature operation						
Gate current	3411	Bias condition C, $V_{DS} = 0$ V; $V_{GS} = +20$ V dc or -20 V dc	I_{GSS2}		± 500	nA dc
Drain current	3413	Bias condition C, $V_{GS} = 0$ V, $V_{DS} = -80$ percent of rated V_{DS} (see 1.3)	I_{DSS2}		100	μ A dc
Static drain to source on-state resistance	3421	$V_{GS} = 10$ V dc; condition A; pulsed (see 4.5.1); $I_D = 1.0$ A dc	$r_{DS(on)3}$			ohms
2N6660 2N6661					5.6 7.5	
Gate to source voltage(threshold)	3403	$V_{DS} \geq V_{GS}$; $I_D = 1.0$ mA dc	$V_{GS(th)2}$	0.3		V dc
Low temperature operation:						
Gate to source voltage (threshold)	3403	$V_{DS} \geq V_{GS}$; $I_D = 1.0$ mA	$V_{GS(th)3}$		2.5	V dc
<u>Subgroup 4</u>						
Switching time test	3472	$R_{GS} = 23 \Omega$, $R_L = 23 \Omega$, $V_{GEN} = 10$ V				
Turn-on delay time		$V_{DD} = 25$ V dc; $I_D \cong 1$ A dc,	$t_{d(on)}$		10	ns
Turn-off delay time		$V_{DD} = 25$ V dc; $I_D \cong 1$ A dc	$t_{d(off)}$		10	ns

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u> - Continued.						
Small signal common source short-circuit input capacitance	3431	$V_{DS} = 25 \text{ V dc}; V_{GS}; = 0 \text{ V}; f = 1 \text{ MHz}$	C_{iss}		50	pF
Small signal common source short-circuit output capacitance		$V_{DS} = 25 \text{ V dc}; V_{GS}; = 0 \text{ V}; f = 1 \text{ MHz},$	C_{oss}		40	pF
Small signal common source short-circuit reverse transfer capacitance	3433	$V_{DS} = 25 \text{ V dc}; V_{GS}; = 0 \text{ V}; f = 1 \text{ MHz}$	C_{rss}		10	pF
<u>Subgroup 5</u>						
Safe operating area		See figure 2				
High voltage test		$V_{DS} = 80 \text{ percent of rated } V_{DS} \text{ (see } 1.3 \text{)}$				
Electrical measurements		See table 1 , subgroup 2.				
<u>Subgroups 6 and 7</u>						
Not applicable						

1/ For sampling plan, see [MIL-PRF-19500](#).

2/ This test required for the following end-point measurements only:
 Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).
 Group B, subgroups 3 and 4 (JANS).
 Group C, subgroup 2 and 6.
 Group E, subgroup 1.

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

Inspection	MIL-STD-750		Sample plan
	Method	Conditions	
<u>Subgroup 1</u>			45 devices c = 0
Temperature cycling	1051	Test condition G, 500 cycles.	
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See table I , subgroup 2.	
<u>Subgroup 2</u>			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.	
<u>Subgroup 4</u>			Sample size N/A
Thermal impedance curves		See MIL-PRF-19500 .	
<u>Subgroup 10</u>			22 devices c = 0
Commutating diode for safe operating area test procedure for measuring dv/dt during reverse recovery of power MOSFET transistors or insulated gate bipolar transistors	3476	Test conditions shall be derived by the manufacturer.	

ACTIVE REGION

2N6660

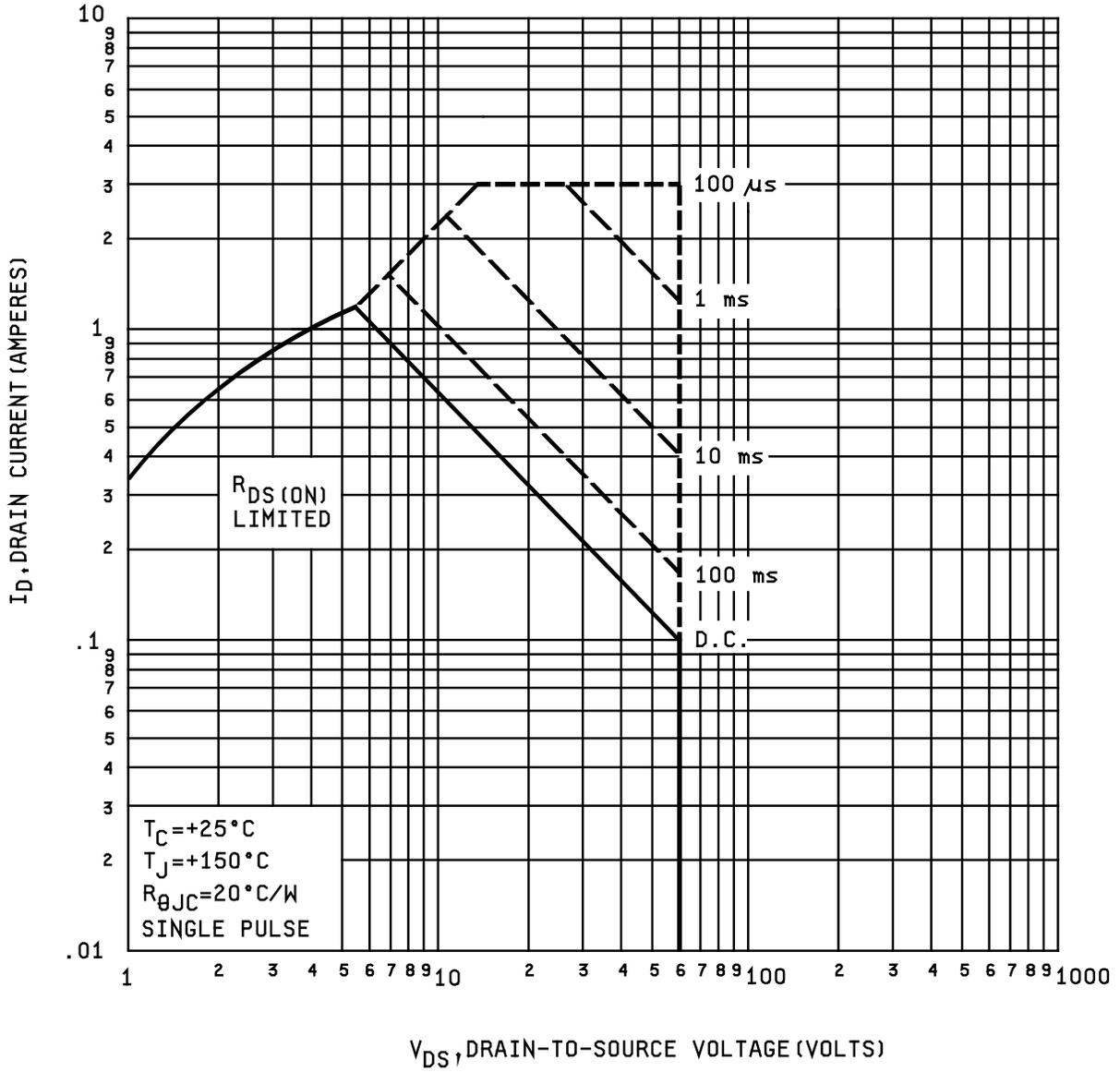


FIGURE 2. Maximum safe operating area.

ACTIVE REGION

2N6661

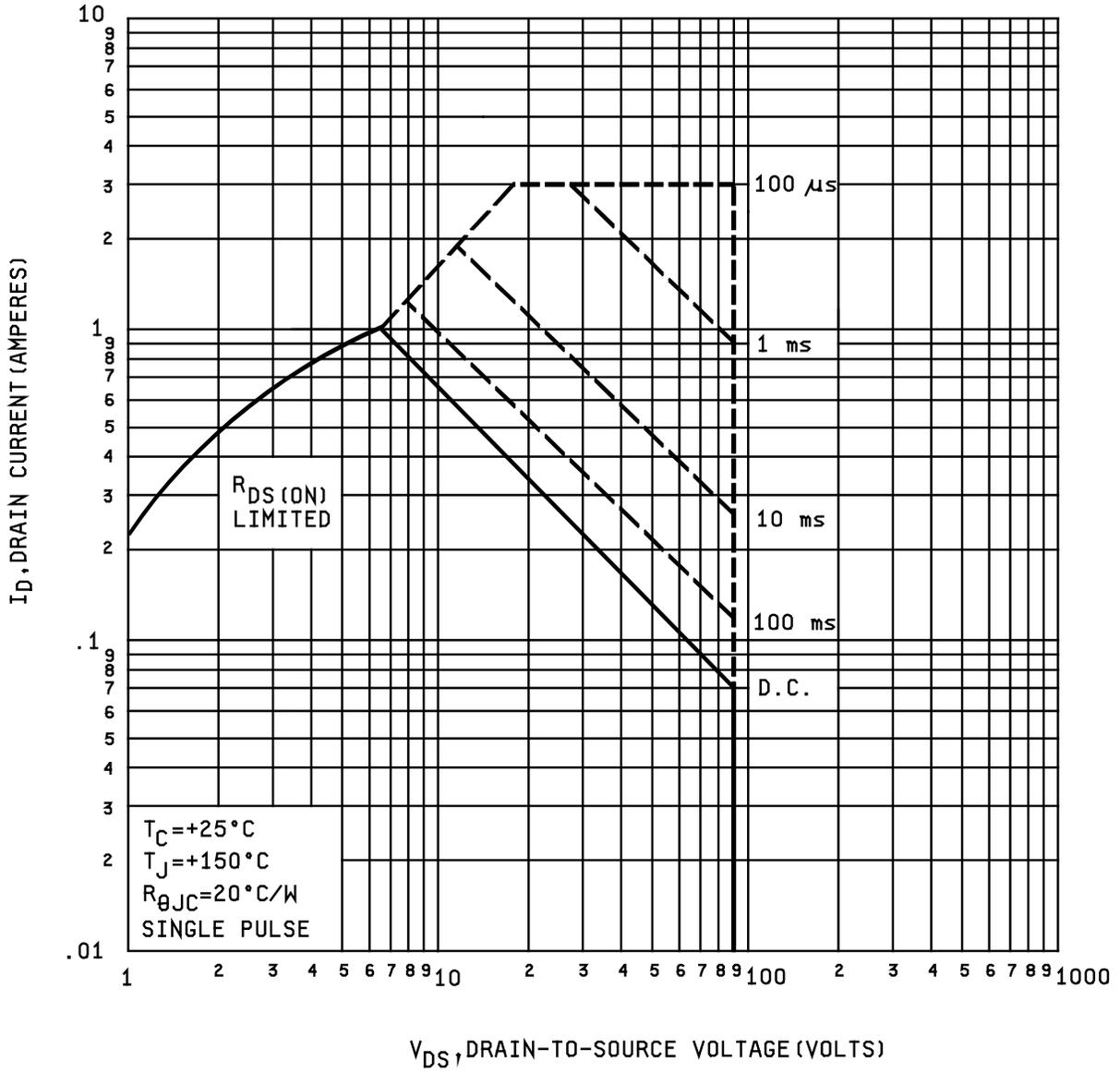


FIGURE 2. Maximum safe operating area - Continued.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory. The notes specified in [MIL-PRF-19500](#) are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see [3.4.1](#)).
- d. 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 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 DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.daps.dla.mil>.

6.4 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 - 85
DLA - CC

Preparing activity:
DLA - CC

(Project 5961-2011-014)

Review activity:
Army - AR

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.daps.dla.mil/>.