

The documentation and process conversion measures necessary to comply with this revision shall be completed by 9 March 2009.

INCH-POUND

MIL-PRF-19500/488E  
 9 December 2008  
 SUPERSEDING  
 MIL-PRF-19500/488D  
 1 May 2007

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, HIGH-POWER,  
 TYPES 2N5671 AND 2N5672,  
 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 NPN, silicon, high-power transistors. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (similar to TO-3).

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

Types	$P_T$ (1) $T_A = +25^\circ\text{C}$	$P_T$ (2) $T_C = +25^\circ\text{C}$	$R_{\theta JC}$	$V_{CBO}$	$V_{CEO}$	$V_{EBO}$	$I_C$	$I_B$	$T_{STG}$ and $T_J$
	<u>W</u>	<u>W</u>	<u><math>^\circ\text{C/W}</math></u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>A dc</u>	<u><math>^\circ\text{C}</math></u>
2N5671	6.0	140	1.25	120	90	7.0	30	10	-65 to +200
2N5672	6.0	140	1.25	150	120	7.0	30	10	

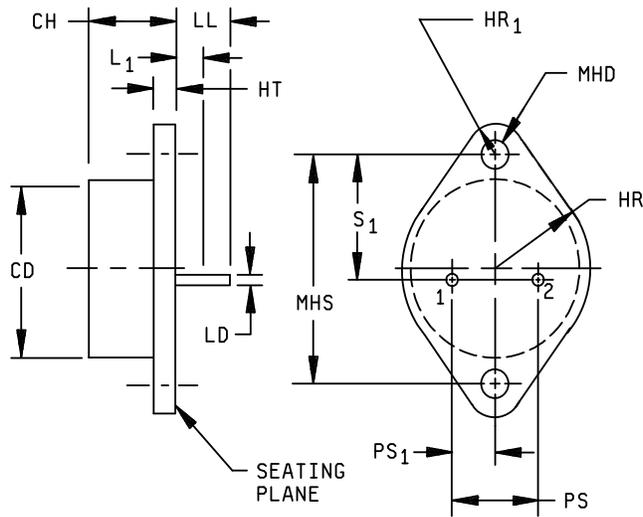
(1) Derate linearly 34.2 mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$ .

(2) Derate linearly 800 mW/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$ .

1.4 Primary electrical characteristics at  $T_A = +25^\circ\text{C}$ .

Limits	$h_{FE1}$	$V_{CE(sat)1}$	$C_{obo}$ 100 kHz < f < 1 MHz	$ h_{fe} $ f = 5 MHz	Pulse response	
	$V_{CE} = 2.0$ V dc $I_C = 15$ A dc	$I_C = 15$ A dc $I_B = 1.2$ A dc	$V_{CB} = 10$ V dc $I_E = 0$	$I_C = 2$ A dc $V_{CE} = 10$ V dc	$t_{on}$	$t_{off}$
		<u>V dc</u>	<u>pF</u>		<u><math>\mu\text{s}</math></u>	<u><math>\mu\text{s}</math></u>
Min	20			10		
Max	100	0.75	900	40	0.5	1.5

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to [Semiconductor@dsc.dla.mil](mailto:Semiconductor@dsc.dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil/>.



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	
CH	.250	.450	6.35	11.43	
HT	.050	.135	1.27	3.43	
HR	.495	.525	12.57	13.34	
HR <sub>1</sub>	.131	.188	3.33	4.78	
LD	.038	.043	0.97	1.09	7
LL	.312		7.92		
L <sub>1</sub>		.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	4
PS <sub>1</sub>	.205	.225	5.21	5.72	4
s <sub>1</sub>	.655	.675	16.64	17.15	

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Terminal 1, emitter; terminal 2, base; case, collector.
4. These dimensions should be measured at points .050-.055 inch (1.27-1.40 mm) below seating plane. When gauge is not used, measurement will be made at the seating plane.
5. The seating plane of the header shall be flat within .004 inch (0.10 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 .006 inch (0.15 mm) concave to .006 inch (0.15 mm) convex overall.
6. Collector shall be electrically connected to the case.
7. LD applies between L<sub>1</sub> and LL. Lead diameter shall not exceed twice LD within L<sub>1</sub>.
8. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

FIGURE 1. Physical dimensions (similar to TO-3).

## 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 <http://assist.daps.dla.mil/quicksearch/> or <http://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.

## 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 manufacturers list 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. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1.

\* 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).

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

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

3.7 Electrical test requirements. The electrical test requirements shall be as specified in table I.

3.8 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 tables I).

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

\* 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)	Measurement	
	JANS level	JANTX and JANTXV levels
(1) 3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	$I_{CEX1}$ and $h_{FE1}$	$I_{CEX1}$
11	$I_{CEX1}$ and $h_{FE1}$ ; $\Delta I_{CEX1}$ = 100 percent of initial value or 20 $\mu$ A dc, whichever is greater. $\Delta h_{FE1}$ = $\pm$ 15 percent of initial value.	$I_{CEX1}$ and $h_{FE1}$ ; $\Delta I_{CEX1}$ = 100 percent of initial value or 20 $\mu$ A dc, whichever is greater.
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein. $\Delta I_{CEX1}$ = 100 percent of initial value or 20 $\mu$ A dc, whichever is greater. $\Delta h_{FE1}$ = $\pm$ 15 percent of initial value.	Subgroup 2 of table I herein. $\Delta I_{CEX1}$ = 100 percent of initial value or 20 $\mu$ A dc, whichever is greater. $\Delta h_{FE1}$ = $\pm$ 25 percent of initial value.

(1) Shall be performed anytime after temperature cycling, screen 3a; and does not need to be repeated in screening requirements.

4.3.1 Power burn-in conditions. Power burn-in conditions are  $T_J = +187.5 \pm 12.5^\circ\text{C}$ ,  $V_{CB} \geq 30$  V dc,  $T_A = +35^\circ\text{C}$  max.  $T_J$  measurement shall be in accordance with method 3100 of MIL-STD-750.

\* 4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3131 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  $\mu$ s max. See table II, group E, subgroup 4 herein.

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 table V of MIL-PRF-19500 and table I 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 4.4.2.1 and 4.4.2.2 herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B4	1037	$V_{CB} \geq 30$ V dc, for 2,000 cycles.
B5	1027	$V_{CB} \geq 30$ V dc, $T_A = +125^\circ\text{C} \pm 25^\circ\text{C}$ for 96 hours; $P_T = 6$ W at $T_A = +112^\circ\text{C}$ or adjusted as required by the chosen $T_A$ to give an average lot $T_J = +275^\circ\text{C}$ . Marking legibility requirement shall not apply.

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

<u>Subgroup</u>	<u>Method</u>	<u>Conditions</u>
B3	1027	For eutectic die attach: $T_A \leq +35^\circ\text{C}$ ; adjust $P_T$ to achieve $T_J = +187.5^\circ\text{C} \pm 5^\circ\text{C}$ , $V_{CB} \geq 30$ V dc
B3	1037	For solder die attach: $V_{CB} \geq 30$ V dc, 2,000 cycles.
B6	1032	$T_A = +200^\circ\text{C}$ .
B7	3053	Load condition C; (unclamped inductive lead, see figure 2); $T_C = +25^\circ\text{C}$ ; duty cycle $\leq 10$ percent; $R_S = 0.1$ ohm;  Test 1: $t_p \approx 150$ $\mu\text{s}$ ; $R_{BB1} = 1\Omega$ ; $V_{BB1} = 10$ V dc max; $R_{BB2} = 20\Omega$ ; $V_{BB2} = 4$ V dc; $I_C = 30$ A dc; $V_{CC} = 10$ V dc, $L = 50\mu\text{H}$ , $0.1\Omega$  Test 2: $t_p \approx 325$ $\mu\text{s}$ ; $R_{BB1} = 40\Omega$ ; $V_{BB1} = 10$ V dc max; $R_{BB2} = 20\Omega$ ; $V_{BB2} = 4$ V dc; $I_C = 6.5$ A dc; $V_{CC} = 10$ V dc, $L = 500\mu\text{H}$ , $0.1\Omega$
B7		Electrical measurements: See table I, subgroup 2 herein.

\* 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>Conditions</u>
C2	1056	Test condition B.
C2	2036	Test condition A, weight = 10 lbs, application time = 15 seconds.
* C5	3131	See 4.5.2, $R_{\theta JC} = 1.25^{\circ}\text{C/W}$ .
C6	1026	For eutectic die attach: $T_A \leq +35^{\circ}\text{C}$ ; adjust $P_T$ to achieve $T_J = +187.5^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , $V_{CB} \geq 30 \text{ V dc}$
C6	1037	For solder die attach: $V_{CB} \geq 30 \text{ V dc}$ , 6,000 cycles.

\* 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. Thermal resistance measurement shall be performed in accordance with method 3131 of MIL-STD-750 using the guidelines in that method for determining  $I_M$ ,  $I_H$ , and  $t_H$ . Measurement delay time  $t_{MD} = 300 \text{ ms max}$ . See table E-IX of MIL-PRF-19500. Forced moving air or draft shall not be permitted across the devices during test.

\* 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>	3131	See 4.3.2	$Z_{\theta JC}$			$^{\circ}\text{C/W}$
Breakdown voltage, collector to emitter 2N5671 2N5672	3011	$I_C = 200 \text{ mA dc}$ ; $L = 15 \text{ mH}$ ; $30 \text{ Hz} \leq f \leq 60 \text{ Hz}$ , (see figure 3)	$V_{(BR)CEO}$	90 120		V dc V dc
Breakdown voltage, collector to emitter  2N5671 2N5672	3011	$I_C = 200 \text{ mA dc}$ ; $L = 15 \text{ mH}$ ; $R_{BE} = 50 \text{ ohms}$ ; $30 \text{ Hz} \leq f \leq 60 \text{ Hz}$ (see figure 3)	$V_{(BR)CER}$	110 140		V dc V dc
Breakdown voltage, collector to emitter  2N5671 2N5672	3011	$I_C = 200 \text{ mA dc}$ ; $L = 2 \text{ mH}$ ; $V_{BE} = -1.5 \text{ V dc}$ ; $30 \text{ Hz} \leq f \leq 60 \text{ Hz}$ (see figure 3)	$V_{(BR)CEX}$	120 150		V dc V dc
Emitter to base cutoff current	3061	Bias condition D; $V_{EB} = 7.0 \text{ V dc}$	$I_{EBO}$		10	mA dc
Collector to emitter cutoff current	3041	Bias condition D; $V_{CE} = 80 \text{ V dc}$	$I_{CEO}$		10	mA dc
Collector to emitter cutoff current 2N5671 2N5672	3041	Bias condition A; $V_{BE} = 1.5 \text{ V dc}$ $V_{CE} = 110 \text{ V dc}$ $V_{CE} = 135 \text{ V dc}$	$I_{CEX1}$		250 250	$\mu\text{A dc}$ $\mu\text{A dc}$
Collector to base cutoff current 2N5671 2N5672	3036	Bias condition D  $V_{CE} = 120 \text{ V dc}$ $V_{CE} = 150 \text{ V dc}$	$I_{CBO}$		25	mA dc
Forward-current transfer ratio	3076	$V_{CE} = 2.0 \text{ V dc}$ ; $I_C = 15 \text{ A dc}$ ; pulsed (see 4.5.1)	$h_{FE1}$	20	100	

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 2</u> - Continued						
Forward-current transfer ratio	3076	$V_{CE} = 5.0$ V dc; $I_B = 20$ A dc; pulsed (see 4.5.1)	$h_{FE2}$	20		
Collector to emitter voltage (saturated)	3071	$I_C = 15$ A dc; $I_B = 1.2$ A dc; pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.75	V dc
Base emitter voltage (saturated)	3066	Test condition A; $I_B = 1.2$ A dc; $I_C = 15$ A dc; pulsed (see 4.5.1)	$V_{BE(sat)}$		1.5	V dc
Collector to emitter voltage (saturated)	3071	$I_C = 30$ A dc; $I_B = 6$ A dc; pulsed (see 4.5.1)	$V_{CE(sat)2}$		5.0	V dc
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +150^\circ\text{C}$				
Collector to emitter cutoff current	3041	Bias condition A; $V_{BE} = -1.5$ V dc;	$I_{CEX2}$			
2N5671 2N5672		$V_{CE} = 100$ V dc $V_{CE} = 100$ V dc			15 10	mA dc mA dc
Low temperature operation:		$T_A = -65^\circ\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 2.0$ V dc; $I_C = 15$ A dc; pulsed (see 4.5.1)	$h_{FE3}$	10		
<u>Subgroup 4</u>						
Magnitude of small-signal short-circuit forward-current transfer ratio	3306	$V_{CE} = 10$ V dc; $I_C = 2.0$ A dc; $f = 5.0$ MHz	$ h_{fe} $	10	40	
Open circuit output capacitance	3236	$V_{CB} = 10$ V dc; $I_E = 0$ ; $100$ kHz $\leq f \leq 1$ MHz	$C_{obo}$		900	pF

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						
Pulse response:	3251	Test condition A; except test circuit and pulse requirements in accordance with figure 4				
Turn-on time		$V_{CC} = 30 \text{ V dc} \pm 2 \text{ V dc}$ ; $I_C = 15 \text{ A dc}$ ; $I_{B1} = 1.2 \text{ A dc}$	$t_{on}$		0.5	$\mu\text{s}$
Turn-off time		$V_{CC} = 30 \text{ V dc} \pm 2 \text{ V dc}$ ; $I_C = 15 \text{ A dc}$ ; $I_{B1} = 1.2 \text{ A dc}$ ; $I_{B2} = 1.2 \text{ A dc}$	$t_{off}$		1.5	$\mu\text{s}$
<u>Subgroup 5</u>						
Safe operating area (continuous dc)	3051	$T_C = +25^\circ\text{C}$ ; $t \geq 1 \text{ s}$ ; 1 cycle; (see figure 5)				
<u>Test 1</u>		$I_C = 5.8 \text{ A dc}$ ; $V_{CE} = 24 \text{ V dc}$				
<u>Test 2</u>		$I_C = 0.9 \text{ A dc}$ ; $V_{CE} = 45 \text{ V dc}$				
<u>Test 3</u>		$I_C = 30 \text{ A dc}$ ; $V_{CE} = 4.67 \text{ V dc}$				
<u>Test 4</u>		$I_C = 0.19 \text{ A dc}$ ; $V_{CE} = 90 \text{ V dc}$				
2N5671 only						
<u>Test 5</u>		$I_C = 0.11 \text{ A dc}$ ; $V_{CE} = 120 \text{ V dc}$				
2N5672 only						

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	
* Safe operating area (switching)	3053	Load condition B; (clamped inductive load) (see figure 6); $T_C = +25^\circ\text{C}$ ; Duty cycle $\leq 10$ percent; $t_p > 10 \mu\text{s}$ ; $R_S = 0.1 \text{ ohm}$ ; $R_{BB1} = 1 \Omega$ ; $V_{BB1} = 10 \text{ V dc max}$ ; $R_{BB2} = 20 \Omega$ ; $V_{BB2} = 4 \text{ V dc}$ ; $I_C = 30 \text{ A dc}$ ; $V_{CC} = 90 \text{ V dc}$ (2N5671) and $120 \text{ V dc}$ (2N5672); $R_L \leq 3.0 \Omega$ (2N5671), $4.0 \Omega$ (2N5672); $L = 50 \mu\text{H}$ , $0.1 \Omega$ ; $CR = 1\text{N}1186\text{A}$ ; Clamp voltage = $90 \text{ V dc} +0, -5$ (2N5671); $120 \text{ V dc} +0, -5$ (2N5672). Device fails if clamp voltage is not reached.				
Electrical measurements		See table I, subgroup 2 herein				
<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 3, 4, and 5 (JANS).  
 Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).  
 Group C, subgroup 2 and 6.  
 Group E, subgroup 1.

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\* 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 (air to air)	1051	Test condition C, 500 cycles.	
Hermetic seal Fine leak Gross leak	1071	Test conditions G or H. Test conditions C or D.	
Electrical measurements		See table I, subgroup 2.	
<u>Subgroup 2</u>			45 devices c = 0
Blocking life	1048	Test temperature = +125°C; $V_{CB}$ = 80 percent of rated; T = 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 8</u>			45 devices c = 0
Reverse stability	1033	Condition B.	

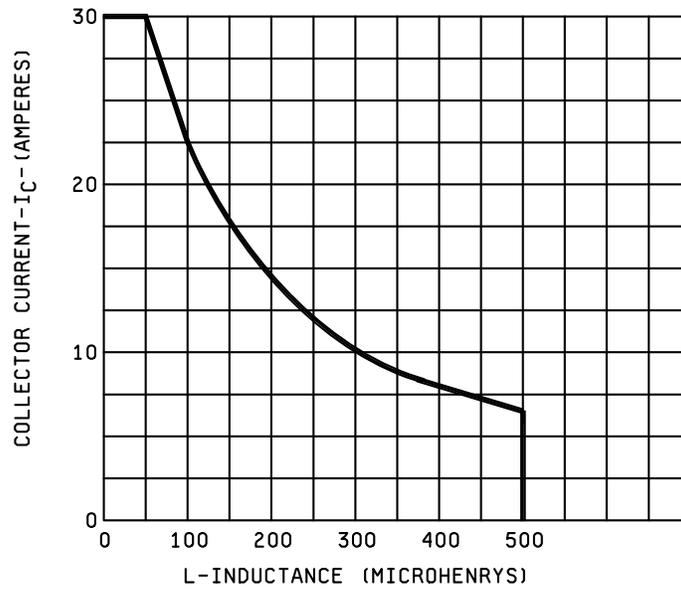
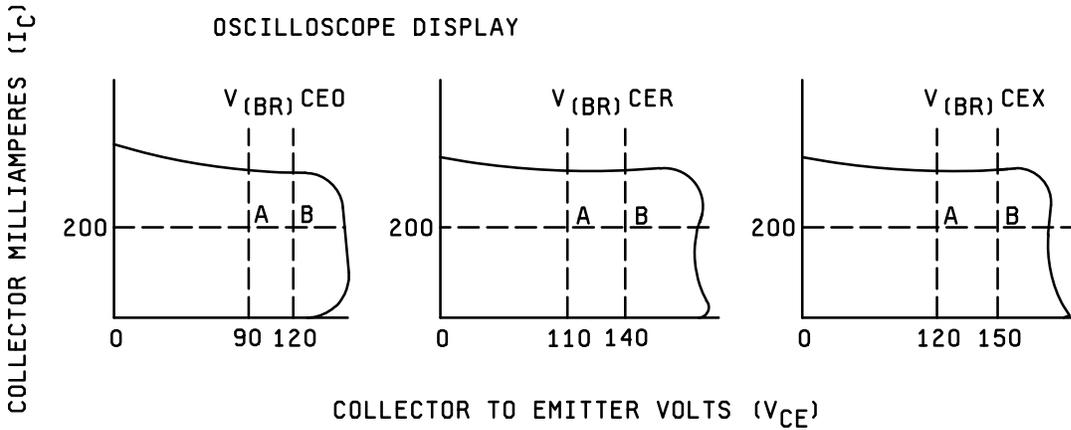
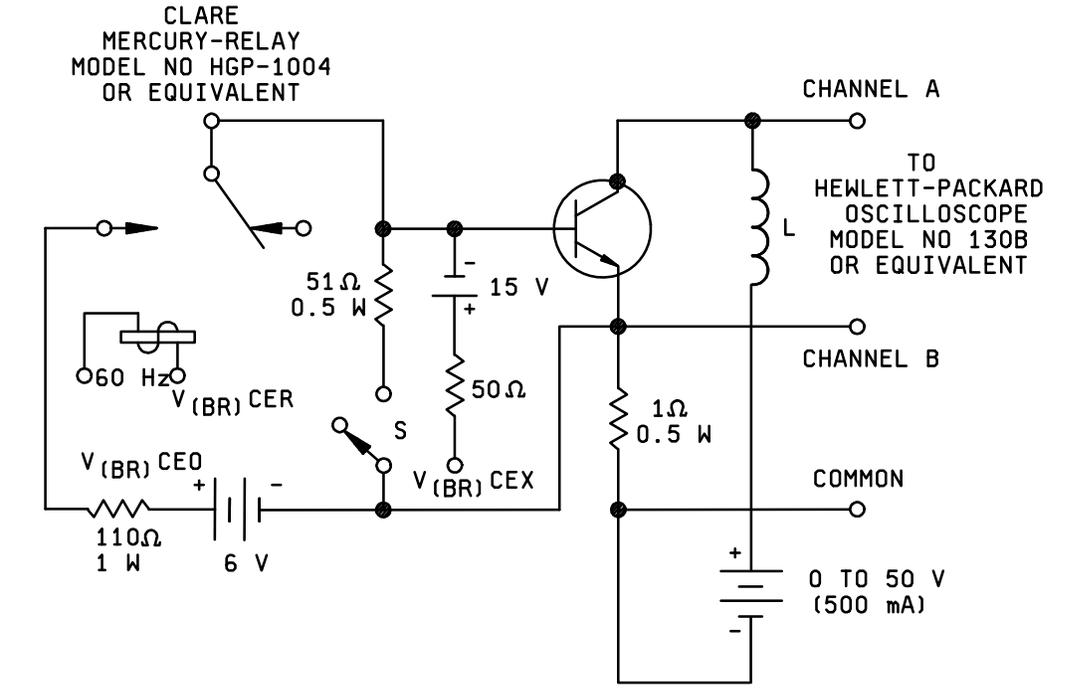
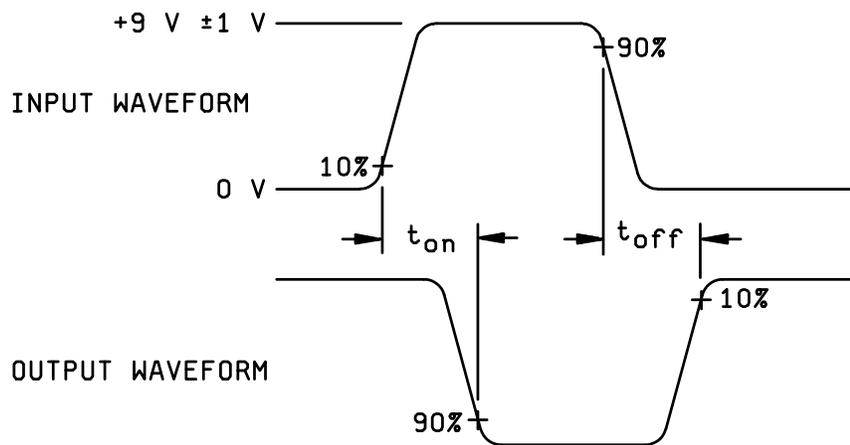
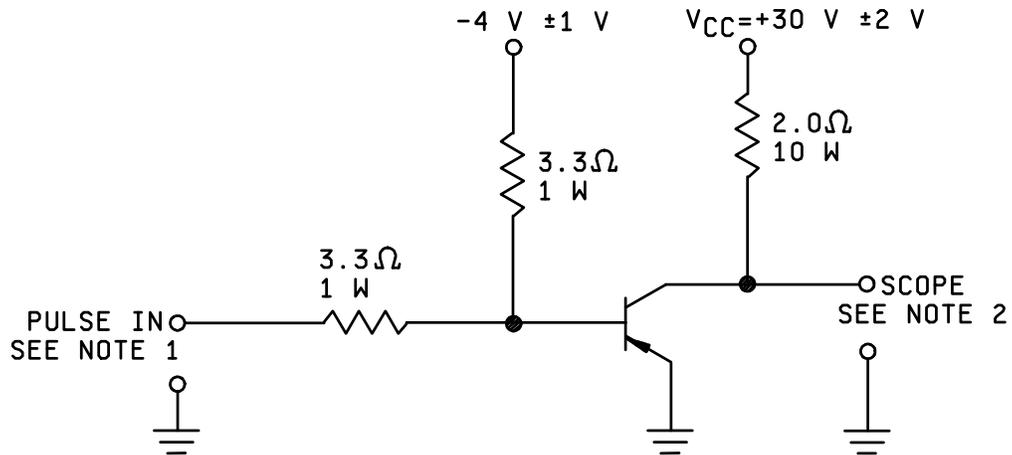


FIGURE 2. Safe operating area for switching between saturation and cutoff (unclamped inductive load).



NOTE:  $V_{(BR)CEO}$ ,  $V_{(BR)CER}$ ,  $V_{(BR)CEX}$ , is acceptable when the trace falls to the right and above point "A" for type 2N5671. The trace shall fall to the right and above point "B" for type 2N5672.

FIGURE 3.  $V_{(BR)CEO}$ ,  $V_{(BR)CER}$ ,  $V_{(BR)CEX}$ , measurement circuit.



## NOTES:

1. The rise time ( $t_r$ ) and fall time ( $t_f$ ) of the applied pulse shall be each  $\leq 20$  ns; duty cycle  $\leq 2$  percent; generator source impedance shall be 50 ohms; pulse width = 20  $\mu$ s.
2. Output sampling oscilloscope:  $Z_{in} \geq 100$  k $\Omega$ ;  $C_{in} \leq 50$  pF; rise time  $\leq 20$  ns.

FIGURE 4. Pulse response test circuit.

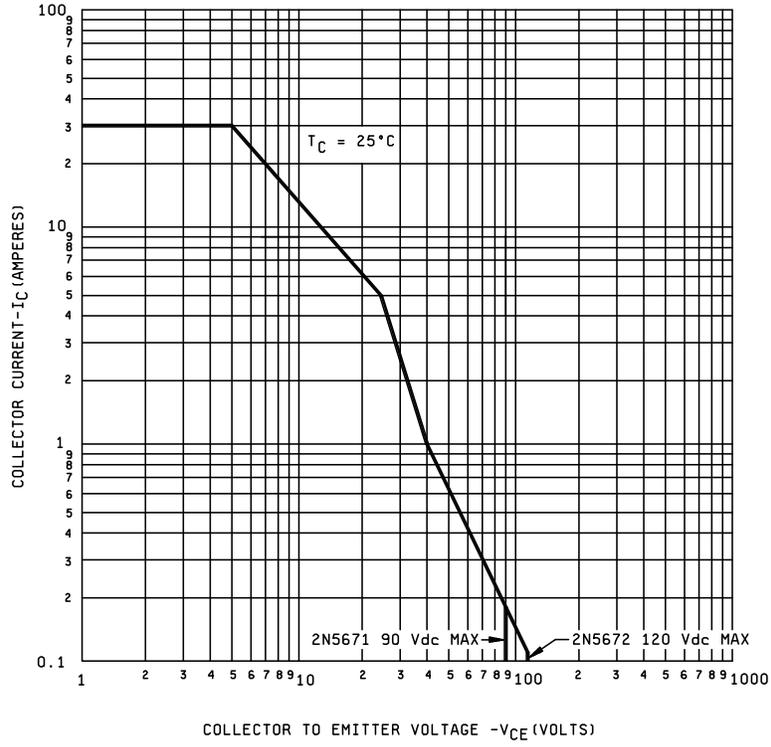


FIGURE 5. Maximum safe operating area graph (continuous dc).

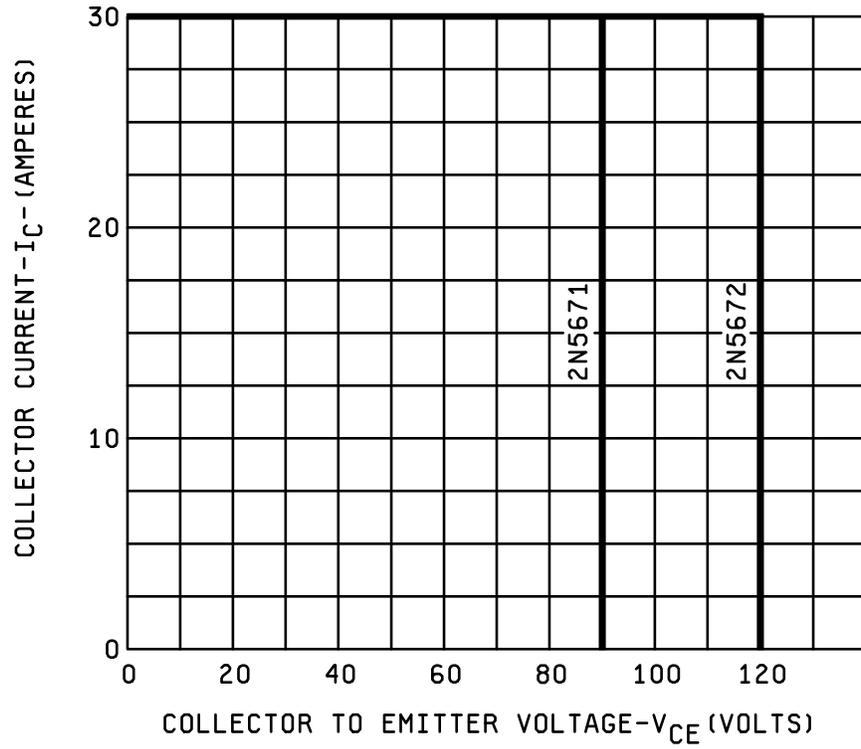


FIGURE 6. Safe operating area for switching between saturation and cutoff (clamped inductive load).

## 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 Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail [vqe.chief@dla.mil](mailto:vqe.chief@dla.mil). An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <http://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  
NASA - NA  
DLA - CC

Preparing activity:  
DLA - CC

(Project 5961- 2008-030)

Review activities:  
Army - AR, MI, SM  
Navy - SH  
Air Force - 13, 19, 99

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 <http://assist.daps.dla.mil/> .