

The documentation and process conversion measures necessary to comply with this document shall be completed by 18 May 2005.

INCH-POUND

MIL-PRF-19500/580B
 18 February 2005
 SUPERSEDING
 MIL-PRF-19500/580A
 2 November 1998

* PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON AMPLIFIER,
 TYPES 2N4234, 2N4235, AND 2N4236, JAN, JANTX, AND JANTXV

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 PNP, silicon, amplifier transistor. Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1, TO-39.

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

Types	$P_T (1)$ $T_A = +25^\circ\text{C}$	$P_T (2)$ $T_C = +25^\circ\text{C}$	$R_{\theta JA}$	$R_{\theta JC}$	I_B	I_C	T_J and T_{STG}	V_{CBO}	V_{CEO}	V_{EBO}
	<u>W</u>	<u>W</u>	<u>$^\circ\text{C/W}$</u>	<u>$^\circ\text{C/W}$</u>	<u>A dc</u>	<u>A dc</u>	<u>$^\circ\text{C}$</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>
2N4234	1.0	6.0	175	29	0.5	1.0	-65 to	40	40	7.0
2N4235	1.0	6.0	175	29	0.5	1.0	+200	60	60	7.0
2N4236	1.0	6.0	175	29	0.5	1.0		80	80	7.0

(1) Derate linearly 5.7 m/W $^\circ\text{C}$ for $T_A > +25^\circ\text{C}$.

(2) Derate linearly 34 m/W $^\circ\text{C}$ for $T_C > +25^\circ\text{C}$.

* 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. 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>

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

Limits	h_{FE} at $V_{CE} = 1.0$ V dc (1)			$ h_{fe} $ f = 1 MHz	C_{obo} f = 100 kHz	$V_{CE(sat)1}$ (1) $I_C = 1.0$ A dc $I_B = 0.1$ A dc	$V_{BE(sat)2}$ (1) $I_C = 1.0$ A dc $I_B = 0.1$ A dc
	h_{FE1} $I_C = 100$ mA dc	h_{FE2} $I_C = 250$ mA dc	h_{FE3} $I_C = 500$ mA dc	$V_{CE} = 10$ V dc $I_{CE} = 100$ mA dc	$V_{CB} = 10$ V dc $I_E = 0$		
Min	40	30	20	3.0	μF	0.6	V dc
Max		150			100		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, 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.

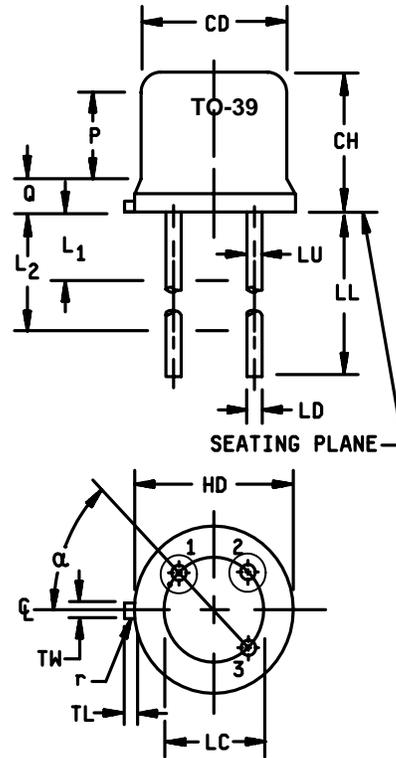
* DEPARTMENT OF DEFENSE STANDARDS

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. 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				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	
LC	.200 TYP		5.08 TYP		7
LD	.016	.021	0.41	0.53	8, 9
LL	.500	.750	12.70	19.05	
LU	.016	.019	0.41	0.48	8, 9
L1		.050		1.27	8, 9
L2	.250		6.35		8, 9
P	.100		2.54		7
Q		.050		1.27	5
r		.010		0.254	10
TL	.029	.045	0.74	1.14	3, 4
TW	.028	.034	0.71	0.86	3
α	45° TP		45° TP		7
Term 1	Emitter				
Term 2	Base				
Term 3	Collector				



NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
8. Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
9. All three leads.
10. The collector shall be internally connected to the case.
11. Dimension r (radius) applies to both inside corners of tab.
12. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
13. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

* FIGURE 1. Physical dimensions (TO-39).

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.

$R_{\theta JA}$	Thermal resistance junction to ambient.
$R_{\theta JC}$	Thermal resistance junction to case.
TRB	Technical review board.

3.4 Interface and physical dimensions. The interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and on figure 1 (TO-39) herein.

3.4.1 Lead finish. Lead material shall be Kovar or Alloy 52 for the TO-39; a copper core or plated core is permitted. 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 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I.

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

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

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).

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 (list applicable JAN levels). 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 appendix E, table IV of MIL-PRF-19500)	Measurement
	JANTX and JANTXV level only
(1) 3c	Method 3131 (see 4.5.2)
7	Optional
11	I_{CBO} and h_{FE2}
12	See 4.3.1.
13	Subgroup 2 of table I herein $\Delta I_{CBO} = 100$ percent of initial value, or 10 nA dc whichever is greater; $\Delta h_{FE2} = \pm 15$ percent of initial value.
14	Required

(1) Shall be performed anytime before screen 10.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows: $V_{CB} = 10 - 30$ V dc; power shall be applied to achieve $T_J + 135^\circ\text{C}$ minimum and minimum power dissipation of $P_D = 75$ percent of maximum rated P_T as defined in 1.3. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, T_J , and mounting conditions) may be used. A justification demonstrating equivalence is required. In addition, the manufacturing site's burn-in data and performance history will be essential criteria for burn-in modification approval. This optional is limited to plants who are at least transitional (QML) approved or have an approved technical review board (TRB).

* 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_{MD} (and V_C where appropriate). The thermal impedance limit used in screen 3c of 4.3 herein and subgroup 2 of table I shall comply with the thermal impedance graph in figures furnished by the manufacturer (less than or equal to the curve value at the same t_H time) and shall be less than the process determined statistical maximum limit as outlined in method 3131.

* 4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500, and as specified herein. If alternate screening is being performed in accordance with MIL-PRF-19500, a sample of screened devices shall be submitted to and pass the requirements of group A1 and A2 inspection only (table VIb, group B, subgroup 1 is not required to be performed again if group B has already been satisfied in accordance with 4.4.2).

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 II 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 VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500, and herein. Electrical measurements (end-points) and delta requirements shall be after each step in 4.4.2.1 and shall be in accordance with table I, subgroup 2 and 4.5.4 herein.

* 4.4.2.1 Group B inspection, appendix E, table VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500. Separate samples may be used for each step. In the event of a lot failure, the resubmission requirements of MIL-PRF-19500 shall apply. In addition, all catastrophic failures during CI shall be analyzed to the extent possible to identify root cause and corrective action. Whenever a failure is identified as wafer lot and /or wafer processing related, the entire wafer lot and related devices assembled from the wafer lot shall be rejected unless an appropriate determined corrective action to eliminate the failures mode has been implemented and the devices from the wafer lot are screened to eliminate the failure mode.

<u>Step</u>	<u>Method</u>	<u>Condition</u>
1	1026	Steady-state life: 1,000 hours minimum, $V_{CB} = 10$ V dc, power shall be applied to achieve $T_J = +150^\circ\text{C}$ minimum using a minimum of $P_D = 75$ percent of maximum rated P_T as defined in 1.3. $n = 45$ devices, $c = 0$. The sample size may be increased and the test time decreased so long as the devices are stressed for a total of 45,000 device hours minimum, and the actual time of test is at least 340 hours.
2	1048	Blocking life, $T_A = +150^\circ\text{C}$, $V_{CB} = 80$ percent of rated voltage, 48 hours minimum. $n = 45$ devices, $c = 0$.
3	1032	High-temperature life (non-operating), $t = 340$ hours, $T_A = +200^\circ\text{C}$. $n = 22$, $c = 0$.

* 4.4.2.3 Group B sample selection. Samples selected from group B inspection shall meet all of the following requirements:

- a. For JAN, JANTX, and JANTXV samples shall be selected randomly from a minimum of three wafers (or from each wafer in the lot) from each wafer lot.
- b. Must be chosen from an inspection lot that has been submitted to and passed table I, subgroup 2, conformance inspection. When the final lead finish is solder or any plating prone to oxidation at high temperature, the samples for life test (group B for JAN, JANTX, and JANTXV) may be pulled prior to the application of final lead finish.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the test and conditions specified for subgroup testing in table VII of MIL-PRF-19500, and in 4.4.3.2 (JAN, JANTX, and JANTXV) herein for group C testing. Electrical measurements (end-points) and delta requirements shall be in accordance with table I, subgroup 2 and 4.5.4 herein.

* 4.4.3.1 Group C inspection, table VII (JAN, JANTX, and JANTXV) of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Test condition E.
C5	3131	See 4.5.3.
C6		Not applicable.

* 4.4.3.2 Group C sample selection. Samples for subgroups in group C shall be chosen at random from any inspection lot containing the intended package type and lead finish procured to the same specification which is submitted to and passes table I tests for conformance inspection. Testing of a subgroup using a single device type enclosed in the intended package type shall be considered as complying with the requirements for that subgroup.

* 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. Delta measurements shall be in accordance with the applicable steps of 4.5.4.

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 response(ΔV_{BE} measurement). The ΔV_{BE} measurement shall be performed in accordance with method 3131 of MIL-STD-750. The ΔV_{BE} conditions and maximum V_{BE} limit shall be derived by each vendor. The chosen ΔV_{BE} measurement and conditions for each device in the qualification lot and read and record measurements shall be submitted in the qualification report and a thermal response curve shall be plotted. The chosen V_{BE} values shall be considered final after the manufacturer has had the opportunity to test five consecutive lots. The following measurements shall apply:

- a. Measuring current (I_M)5 mA.
- b. Measurement voltage (V_{CE}).....20 V (same as V_H).
- c. Collector heating current (I_H)200 mA (minimum for).
- d. Collector-emitter heating voltage.....20 V (minimum).
- e. Heating time (t_H)10 ms.
- f. Measurement time delay (t_{MD})5 μ s.
- g. Sample window time (t_{SW})10 μ s maximum.

4.5.3 Thermal resistance. Thermal resistance measurements shall be conducted in accordance with method 3131 of MIL-STD-750. Maximum limit of $R_{\theta JC}$ shall be $29^{\circ}\text{C}/\text{W}$. The following test conditions shall apply:

- a. Heating power shall be chosen such that the calculated junction to reference point temperature difference is greater than $+50^{\circ}\text{C}$.
- b. Collector to emitter voltage magnitude shall be 20 V dc.
- c. Reference temperature measuring point shall be the case.
- d. Reference point temperature shall be $+25^{\circ}\text{C} \leq T_R \leq +35^{\circ}\text{C}$ and recorded before the test is started.
- e. Mounting arrangement shall be with heat sink to case.
- f. Maximum limit shall be $R_{\theta JC} = 29^{\circ}\text{C}/\text{W}$.

* 4.5.4 Delta requirements. Delta requirements shall be as specified below:

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Collector to base cutoff current 2N4234 2N4235 2N4236	3036	Bias condition D $V_{CB} = 40 \text{ V dc}$ $V_{CB} = 60 \text{ V dc}$ $V_{CB} = 80 \text{ V dc}$	ΔI_{CBO} (1)	100 percent of initial value or 10 nA dc whichever is greater.	1.	Collect or to base cutoff current 2N4234 2N4235 2N4236
2.	Forward current transfer ratio	3076	$I_C = 250 \text{ mA dc}$ $V_{CE} = 1.0 \text{ V dc};$ pulsed (see 4.5.1)	Δh_{FE2} (1)	± 25 percent change from initial recorded value.	2.	Forward current transfer ratio

(1) Devices which exceed the table I limits for this test shall not be shipped.

MIL-PRF-19500/580B

* TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1 2/</u>						
Visual and mechanical examination <u>3/</u>	2071	n = 45 devices, c = 0				
Solderability <u>3/</u>	2026	n = 15 devices, c = 0				
Resistance to solvents <u>3/ 4/</u>	1022	n = 15 devices, c = 0				
Temp cycling <u>3/</u>	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements		Table I, subgroup 2				
Bond strength <u>3/</u>	2037	Precondition T _A = +250°C at t = 24 hrs or T _A = +300°C at t = 2 hrs n = 11 wires, c = 0				
Decap internal visual design verification	2075	n = 4, c = 0.				
<u>Subgroup 2</u>						
Thermal impedance	3131	See 4.3.2	Z _{θJX}			°C/W
Breakdown voltage collector to emitter	3011	Bias condition D; I _C = 100 mA dc; pulsed (see 4.5.1)	V _{(BR)CEO}			
2N4234				40		V dc
2N4235				60		V dc
2N4236				80		V dc
Collector emitter cutoff current	3041	Bias condition D	I _{CEO}			
2N4234		V _{CB} = 30 V dc			1.0	mA dc
2N4235		V _{CB} = 40 V dc			1.0	mA dc
2N4236		V _{CB} = 60 V dc			1.0	mA dc
Collector emitter cutoff current	3041	Bias condition A, V _{BE} = 1.5 V dc	I _{CEX1}			
2N4234		V _{CB} = 40 V dc			100	nA dc
2N4235		V _{CB} = 60 V dc			100	nA dc
2N4236		V _{CB} = 80 V dc			100	nA dc

See footnotes at end of table.

MIL-PRF-19500/580B

* TABLE I. Group A inspection - Continued.

Inspection 1/ <u>Subgroup 2</u> - Continued	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Collector base cutoff current	3036	Bias condition D	I_{CBO}			
2N4234		$V_{CB} = 40$ V dc			100	nA dc
2N4235		$V_{CB} = 60$ V dc			100	nA dc
2N4236		$V_{CB} = 80$ V dc			100	nA dc
Emitter to base cutoff current	3061	Bias condition D, $V_{BE} = 7$ V dc	I_{EBO}		0.5	mA dc
Forward current transfer ratio	3076	$I_C = 100$ mA dc $V_{CE} = 1.0$ V dc; pulsed (see 4.5.1).	h_{FE1}	40		
Forward current transfer ratio	3076	$I_C = 250$ mA dc $V_{CE} = 1.0$ V dc; pulsed (see 4.5.1).	h_{FE2}	30	150	
Forward current transfer ratio	3076	$I_C = 500$ mA dc $V_{CE} = 1.0$ V dc; pulsed (see 4.5.1).	h_{FE3}	20		
Collector to emitter voltage (saturated)	3071	$I_C = 1.0$ A dc, $I_B = 100$ mA dc; pulsed (see 4.5.1).	$V_{CE(sat)1}$		0.6	V dc
Collector to emitter voltage (saturated)	3071	$I_C = 500$ mA dc, $I_B = 50$ mA dc; pulsed (see 4.5.1).	$V_{CE(sat)2}$		0.4	V dc
Base emitter voltage	3066	Test condition A, pulsed (see 4.5.1), $I_C = 500$ mA dc, $I_B = 50$ mA dc	$V_{BE(sat)1}$		1.1	V dc
Base emitter voltage	3066	Test condition A, $I_C = 1.0$ A dc, $I_B = 100$ mA dc, pulsed (see 4.5.1).	$V_{BE(sat)2}$		1.5	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}			
2N4234		$V_{CE} = 30$ V dc			1.0	mA dc
2N4235		$V_{CE} = 40$ V dc			1.0	mA dc
2N4236		$V_{CE} = 60$ V dc			1.0	mA dc

See footnotes at end of table.

MIL-PRF-19500/580B

* TABLE I. Group A inspection - Continued.

Inspection ^{1/}	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 3</u> - Continued						
Low-temperature operation:		$T_A = -55^\circ\text{C}$				
Forward current transfer ratio	3076	$I_C = 250 \text{ mA dc}$, $V_{CE} = 1.0 \text{ V dc}$; pulsed (see 4.5.1),	h_{FE4}	15		
<u>Subgroup 4</u>						
Magnitude of small-signal short-circuit forward-current transfer ratio	3306	$I_C = 100 \text{ mA dc}$, $V_{CE} = 10 \text{ V dc}$, $f = 1 \text{ MHz}$	$ h_{FE} $	3		
Open circuit output capacitance	3236	$I_E = 0$, $V_{CB} = 10 \text{ V dc}$, $f = 100 \text{ MHz}$	C_{obo}		100	pF
<u>Subgroup 5</u>						
Safe operating area (continuous dc)	3051	$T_C = +25^\circ\text{C}$; $t \geq 0.5 \text{ s}$, 1 cycle.				
<u>Test 1</u>		$I_C = 1.0 \text{ A dc}$, $V_{CE} = 6 \text{ V dc}$,				
<u>Test 2</u>		$I_C = 500 \text{ mA dc}$, $V_{CE} = 12 \text{ V dc}$,				
<u>Test 3</u>						
2N4234		$I_C = 166 \text{ mA dc}$, $V_{CE} = 30 \text{ V dc}$				
2N4235		$I_C = 100 \text{ mA dc}$, $V_{CE} = 50 \text{ V dc}$				
2N4236		$I_C = 71 \text{ mA dc}$, $V_{CE} = 70 \text{ V dc}$				
End point electricals		See 4.5.4, steps 1 and 2				
<u>Subgroups 6 and 7</u>						
Not applicable						

^{1/} For sampling plan, see MIL-PRF-19500.

^{2/} For resubmission of failed subgroup 1 of table I, double the sample size of the failed test or sequence of tests. A failure in table I, subgroup 1 shall not require retest of the entire subgroup. Only the failed test shall be rerun upon submission.

^{3/} Separate samples may be used.

^{4/} Not required for laser marked devices.

MIL-PRF-19500/580B

* TABLE II. Group E inspection (all quality levels) for qualification an requalification only.

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method	Conditions	
<u>Subgroup 1</u>			22 devices c = 0
Thermal shock (glass strain)	1056	0°C to + 100°C, 100 cycles	
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See 4.5.4, steps 1 and 2	
<u>Subgroup 2</u>			32 devices c = 0
High temperature reverse bias	1039	Test condition A, 1,000 hours	
Electrical measurements		See 4.5.4, steps 1 and 2	
<u>Subgroup 4</u>			
Thermal impedance curves		Each supplier shall submit their qualification lot average and design maximum thermal impedance curves to the qualifying activity. In addition, the optimal test conditions and thermal impedance limit shall be provided to the qualifying activity in the qualification report.	Sample size N/A
<u>Subgroups 5 and 6</u>			
Not applicable			
<u>Subgroup 8</u>			45 devices c = 0
Reverse stability	1033	Condition B.	

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 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.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

* 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.

6.4 Application guidance. The following NPN type transistor is complementary to the PNP device listed herein.

<u>NPN</u>	<u>PNP</u>
2N4237	2N4234
2N4238	2N4235
2N4239	2N4236

6.5 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.

Military PIN	Manufacturer's CAGE Code	Manufacturer's and user's PIN
JAN2N4234 or JANTX2N4234 or JANTXV2N4234	43611	2N4234 ST1054H
JAN2N4235 or JANTX2N4235 or JANTXV2N4235	43611	2N4235 ST1351H
JAN2N4236 or JANTX2N4236 or JANTXV2N4236	43611	2N4236 ST1374H ST1559H ST1711H ST347H ST675H10 ST675H11 ST675H12 ST688H ST801H ST831H

6.6 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

Preparing activity:
 DLA - CC
 (Project 5961-2753)

Review activities:
 Army - AR, MI, SM
 Navy - AS, MC, OS
 Air Force - 19

* 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/>.