

The documentation and process conversion measures necessary to comply with this revision shall be completed by 9 August 2000.

INCH-POUND

MIL-PRF-19500/357F
 9 June 2000
 SUPERSEDING
 MIL-PRF-19500/357E
 31 August 1998

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, AMPLIFIER
 TYPES 2N3634 THROUGH 2N3637, 2N3634L THROUGH 2N3637L
 JAN, JANTX, JANTXV, JANS, JANHC AND JANKC

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

1. SCOPE

1.1 Scope. This specification covers the performance requirements for PNP, silicon, low-power amplifier, and switching transistors. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500 and two levels of product assurance are provided for each unencapsulated device type.

1.2 Physical dimensions. See figure 1 (TO-39, TO-5) and figure 2 (JANC AND JANKC).

1.3 Maximum ratings.

Types	P _T 1/ T _A = +25°C	P _T 2/ T _C = +25°C	V _{CBO}	V _{CEO}	V _{EBO}	I _C	T _J and T _{STG}	R _{θJA}	R _{θJC}
	<u>W</u>	<u>W</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>°C</u>	<u>°C/W</u>	<u>°C/W</u>
2N3634, 2N3634L	1	5	140	140	5	1	-65 to +200	175	35
2N3635, 2N3635L	1	5	140	140	5	1			
2N3636, 2N3636L	1	5	175	175	5	1			
2N3637, 2N3637L	1	5	175	175	5	1			

1/ Derate linearly 5.71 mW/°C for T_A > +25°C.

2/ Derate linearly 28.6 mW/°C for T_C > +25°C.

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

Types	h _{FE} at V _{CE} = 10 V dc					h _{ie}		C _{obo}	
	h _{FE1} I _C = 0.1 mA dc 1/	h _{FE2} I _C = 1.0 mA dc 1/	h _{FE3} I _C = 10 mA dc 1/	h _{FE4} I _C = 50 mA dc 1/	h _{FE5} I _C = 150 mA dc 1/	V _{CE} = 30 V dc I _C = 30 mA dc f = 100 Mhz		V _{CB} = 20 V dc I _E = 0 100 KHz ≤ f ≤ 1 Mhz	
	<u>Min</u>	<u>Min</u>	<u>Min</u>	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
2N3634	25	45	50	50	150	30		1.5	8.0
2N3635	55	90	100	100	300	60		2.0	8.5
2N3636	25	45	50	50	150	30		1.5	8.0
2N3637	55	90	100	150	300	60		2.0	8.5

1/ Pulsed (see 4.5.1).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAC, P. O. Box 3990, Columbus, OH 43213-1199, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5961

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

	$V_{CE(sat)1}$	$V_{CE(sat)2}$	$V_{BE(sat)1}$	$V_{BE(sat)2}$	Switching parameters (see figure 3)			
	$I_C = 10 \text{ mA}$ dc <u>1/</u> $I_B = 1 \text{ mA}$ dc	$I_C = 50 \text{ mA}$ dc <u>1/</u> $I_B = 5 \text{ mA}$ dc	$I_C = 10 \text{ mA}$ dc <u>1/</u> $I_B = 1 \text{ mA}$ dc	$I_C = 50 \text{ mA}$ dc <u>1/</u> $I_B = 5 \text{ mA}$ dc	t_d	t_r	t_s	t_f
	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	ns	ns	ns	ns
Minimum	0.3	0.6	0.8	0.65	100	100	500	150
Maximum				0.90				

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 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

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available 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 (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

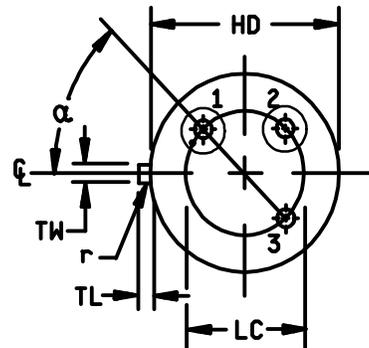
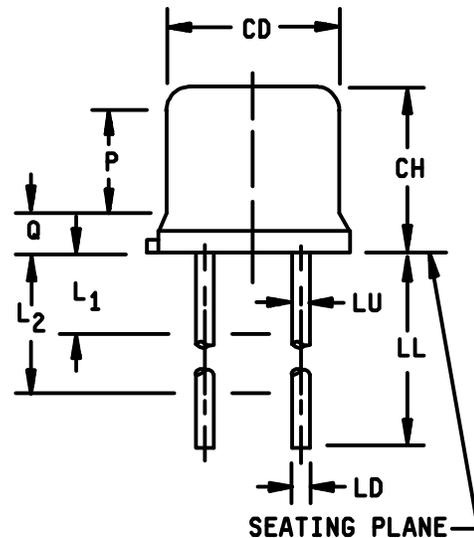
3. REQUIREMENTS

3.1 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Associated specification. The individual item requirements shall be in accordance with MIL-PRF-19500 and as specified herein.

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be specified in MIL-PRF-19500.

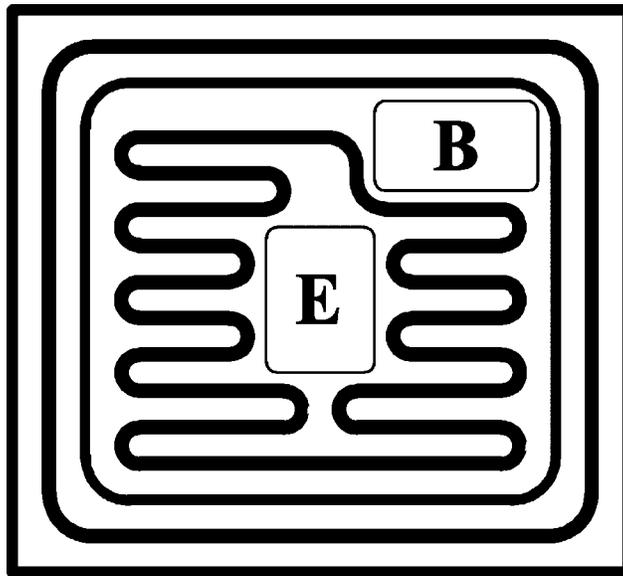
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TYP		5.08 TYP		7
LD	.016	.021	0.41	0.53	6
LL	See notes 7, 9, and 10				
LU	.016	.019	0.41	0.48	7
L1		.050		1.27	7
L2	.250		6.35		7
P	.100		2.54		5
Q		.050		1.27	
r		.010		0.254	8
TL	.029	.045	0.74	1.14	4
TW	.028	.034	0.71	0.86	3
α	45° TP		45° TP		6
Term 1	Emitter				
Term 2	Base				
Term 3	Collector				



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Beyond r maximum, TW must be held to a minimum length of 0.021 inch (.53 mm).
4. TL measured from maximum HD.
5. CD shall not vary more than ± 0.010 inch (.25 mm) in zone P. This zone is controlled for automatic handling.
6. Leads at gauge plane 0.054 - 0.055 inch (1.37-1.40 mm) below seating plane shall be within 0.007 inch (.18 mm) radius of true position (TP) at a maximum material condition (MMC) relative to the tab at MMC. The device may be measured by direct methods or by gauge and gauging procedure.
7. LU applies between L1 and L2. LD applies between L2 and L minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
8. r (radius) applies to both inside corners of tab.
9. For transistor types 2N3634 through 2N3637, LL is 0.500 inch (12.70 mm) minimum, and 0.750 inch (19.50 mm) maximum (TO-39).
10. For transistor types 2N3634L through 2N3637L, LL is 1.500 inches (38.10 mm) minimum, and 1.750 inches (44.45 mm) maximum (TO-5).
11. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 1. Physical dimensions (TO-5 and TO-39).



1. Chip size.....24 x 26 mils \pm 2 mils
2. Chip thickness.....10 \pm 1.5mils nominal
3. Top metal.....Aluminum 15,000 \AA minimum, 18,000 \AA nominal
4. Back metal.....A. Al/Ti/Ni/Ag 12k \AA /3k \AA /7k \AA /7k \AA min., 15k \AA /5k \AA /10k \AA /10k \AA nom.
B. Gold 2,500 \AA minimum, 3,000 \AA nominal
C. Eutectic Mount – No Gold
5. Backside.....Collector
6. Bonding pad.....B = 4 x 6 mils, E = 4 x 5.5 mils

FIGURE 2. JANHCA and JANKCA die dimensions.

3.4 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, and figure 1 herein.

3.4.1 Lead finish. Lead finish shall be solderable as defined in 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 herein.

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

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3 herein.

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 table II herein.

4.3 Screening (JANTX, JANTXV, and JANS levels only). Screening shall be in accordance with table II 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 IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	I_{CBO2} and h_{FE5}	Not applicable
10	24 hours minimum.	24 hours minimum.
11	I_{CBO2} and h_{FE5} ΔI_{CBO2} = 100 percent of initial value or 10 nA dc, whichever is greater; Δh_{FE5} = ± 15 percent of initial value.	I_{CBO2} and h_{FE5}
12	See 4.3.1 240 hours minimum.	See 4.3.1 80 hours minimum.
13	Subgroups 2 and 3 of table I herein; ΔI_{CBO2} = 100 percent of initial value or 10 nA dc, whichever is greater. Δh_{FE5} = ± 15 percent of initial value.	Subgroup 2 of table I herein; ΔI_{CBO2} = 100 percent of initial value or 10 nA dc, whichever is greater. Δh_{FE5} = ± 15 percent of initial value.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:

$V_{CB} = 10 - 30$ Vdc, $T_A =$ room ambient as defined in 4.5 of MIL-STD-750 and as follows:

Power shall be applied to the device to achieve a junction temperature of $T_J = 135$ degrees C min and a minimum power dissipation of $P_D = 75\%$ of maximum P_T (see 1.3).

4.3.2 Thermal impedance ($Z_{\theta JX}$ measurements). The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, Method 3131.

- | | | |
|----|------------------------------------|---------------------|
| a. | I_M measurement current | 5 mA. |
| b. | I_H forward heating current | 200 mA (minimum). |
| c. | t_H heating time | 25 - 30 ms. |
| d. | t_{md} measurement delay time | 60 μ s maximum. |
| e. | V_{CE} collector-emitter voltage | 10 V dc |

The maximum limit for $Z_{\theta JX}$ under these test conditions are $Z_{\theta JX} (\text{max}) = 35^\circ\text{C/W}$.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein. If alternate screening is being performed per MIL-PRF-19500, a sample of screened devices shall be submitted to and pass the requirements of group A1 and group 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 herein).

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 VIa (JANS) of MIL-PRF-19500 and 4.4.2.1 herein. Electrical measurements (end-points) and delta requirements shall be in accordance with group A, subgroup 2 and 4.5.3 herein. See 4.4.2.2 for JAN, JANTX, and JANTXV group B testing. Electrical measurements (end-points) and delta requirements for JAN, JANTX, and JANTXV shall be after each step in 4.4.2.2 and shall be in accordance with group A, subgroup 2 and 4.5.3 herein.

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

Subgroup	Method	Condition
B4	1037	$V_{CB} = 10 - 30$ V dc; $P_T = 1.0$ W at $T_A =$ Room ambient as defined in the general requirements of MIL-STD-750 (see 4.5); $t_{on} = t_{off} = 3$ minutes minimum for 2,000 cycles. No heat sink or forced- air cooling on devices shall be permitted.
B5	1027	$V_{CB} = 10 - 30$ V dc; $T_A = +125^\circ\text{C} \pm 25^\circ\text{C}$ for 96 hours with P_T adjusted according to the chosen T_A to give $T_J = +275^\circ\text{C}$ minimum. Optionally, this test may be performed for a minimum of 216 hours with P_T adjusted to achieve a $T_J = +225^\circ\text{C}$; sample size = 45, c = 0. In this case the ambient temperature shall be adjusted such that a $P_T \geq 75\%$ of maximum rated P_T (see 1.3) is applied to the DUT. (Note: If a failure occurs, resubmission shall be at the test conditions of the original sample.)

4.4.2.2 Group B inspection (JAN, JANTX, and JANTXV). 1/

Step	Method	Condition
1	1039	Steady-state life: Test condition B, 340 hours, $V_{CB} = 10 - 30$ V dc. $n = 45$, $C = 0$. Power shall be applied to the device to achieve $T_J \geq 150^\circ\text{C}$ and power dissipation of $P_D \geq 75\%$ of the rated P_T (see 1.3).
2	1039	The steady-state life test of step 1 shall be extended to 1,000 hours for each die design. Samples shall be selected from a wafer lot every twelve months of wafer production. Group B step 2 shall not be required more than once for any single wafer lot. $n = 45$, $C = 0$.
3	1032	High- temperature life (non operating), $T_A = +200^\circ\text{C}$, $t = 340$ hours, $n = 22$, $C = 0$.

1/ Separate samples may be used for each step. In the event of a group B failure, the manufacturer may pull a new sample at double size from either the failed assembly lot or from another assembly lot from the same wafer lot. If the new "assembly lot" option is exercised, the failed assembly lot shall be scrapped.

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

- a. (or from each wafer in the lot) from each wafer lot. For JANS, samples shall be selected from each inspection lot. See MIL-PRF-19500.
- b. Must be chosen from an inspection lot that has been submitted to and passed group A, 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 (subgroups B4 and B5 for JANS, and 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 conditions specified for subgroup testing in table VII of MIL-PRF-19500, and in 4.4.3.1 (JANS).and 4.4.3.2 (JAN, JANTX, and JANTXV) herein for group C testing.

4.4.3.1 Group C inspection, table VII (JANS) of MIL-PRF-19500.

Subgroup	Method	Condition
C2	2036	Test condition E.
C6	1026	1,000 hours at $V_{CB} = 10 - 30$ V dc; Power shall be applied to the device to achieve $T_J \geq 150^\circ\text{C}$ and a power dissipation of $P_D \geq 75\%$ of the rated P_T (see 1.3).

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

Subgroup	Method	Condition
C2	2036	Test condition E.
C6		Not applicable.

4.4.3.3 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 group A 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 performed for qualification or requalification only. The tests specified in table II herein must be performed to maintain qualification.

4.5 Method 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 Input capacitance. This test shall be conducted in accordance with method 3240 of MIL-STD-750, except the output capacitor shall be omitted.

4.5.3 Delta Requirements. Delta requirements shall be as specified below:

Step	Inspection	MIL-STD-750		Symbol	Limit	Unit
		Method	Conditions			
1	Collector-base cutoff current	3036	Bias condition D, $V_{CB} = 100$ V dc	ΔI_{CB02} <u>1/</u>	100% of initial value or ± 20 nA dc, whichever is greater.	
2	Forward current transfer ratio	3076	$V_{CE} = 10$ V dc; $I_C = 150$ mA dc; pulsed see 4.5.1	Δh_{FE5} <u>1/</u>	$\pm 25\%$ change from initial reading.	

1/ Devices which exceed the group A limits for this test shall not be accepted.

4.5.4 Noise figure. Noise figure shall be measured using a model 310B Quan Tech Laboratories test set, or equivalent. Conditions shall be as specified in table I herein.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1 2/</u>						
Visual and mechanical inspection 3/	2071	n = 45 devices, c = 0				
Solderability 3/ 5/	2026	n = 15 leads, c = 0				
Resistance to solvents 3/ 4/ 5/	1022	n = 15 devices, c = 0				
Temp cycling 3/ 5/	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal 5/ Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements 5/		Group A, subgroup 2				
Bond strength 3/ 5/	2037	Precondition T _A = + 250°C at t = 24 hours or T _A = + 300°C at t = 2 hours n = 11 wires, c = 0				
<u>Subgroup 2</u>						
Collector to base, cutoff current 2N3634, 2N3634L 2N3635, 2N3635L 2N3636, 2N3636L 2N3637, 2N3637L	3036	Bias condition D V _{CB} = 140 V dc V _{CB} = 175 V dc	I _{CBO1}		100	nA dc
Emitter to base, cutoff current	3061	Bias condition D, V _{EB} = 5 V dc	I _{EBO1}		10	μA dc
Breakdown voltage, collector to emitter 2N3634, 2N3634L 2N3635, 2N3635L 2N3636, 2N3636L 2N3637, 2N3637L	3011	Bias condition D, I _C = 10 mA dc pulsed (see 4.5.1)	V _{(BR)CEO}		140 175	V dc
Collector to base cutoff current	3036	Bias condition D, V _{CB} = 100 V dc	I _{CBO2}		100	nA dc
Emitter to base cutoff current	3061	Bias condition D, V _{EB} = 3 V dc	I _{EBO2}		50	nA dc
Collector to emitter cutoff current	3041	Bias condition D, V _{CE} = 100 V dc	I _{CEO}		10	μA dc

See footnote 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-current transfer ratio 2N3634, 2N3634L 2N3636, 2N3636L 2N3635, 2N3635L 2N3637, 2N3637L	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 0.1 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE1}	25		
Forward-current transfer ratio 2N3634, 2N3634L 2N3636, 2N3636L 2N3635, 2N3635L 2N3637, 2N3637L	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 1.0 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE2}	45	90	
Forward-current transfer ratio 2N3634, 2N3634L 2N3636, 2N3636L 2N3635, 2N3635L 2N3637, 2N3637L	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 10 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE3}	50	100	
Forward-current transfer ratio 2N3634, 2N3634L 2N3636, 2N3636L 2N3635, 2N3635L 2N3637, 2N3637L	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 50 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE4}	50	150	
Forward-current transfer ratio 2N3634, 2N3634L 2N3636, 2N3636L 2N3635, 2N3635L 2N3637, 2N3637L	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 150 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE5}	30	60	
Collector to emitter voltage (saturated)	3071	$I_C = 10 \text{ mA dc}$, $I_B = 1 \text{ mA dc}$ pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.3	V dc
Collector to emitter voltage (saturated)	3071	$I_C = 50 \text{ mA dc}$, $I_B = 5 \text{ mA dc}$ pulsed (see 4.5.1)	$V_{CE(sat)2}$		0.6	V dc
Base-emitter voltage (saturated)	3066	Test condition A; $I_C = 10 \text{ mA dc}$, $I_B = 1.0 \text{ mA dc}$ pulsed (see 4.5.1)	$V_{BE(sat)1}$		0.8	V dc

See footnote 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						
Base-emitter voltage (saturated)	3066	Test condition A; $I_C = 50$ mA dc, $I_B = 5$ mA dc pulsed (see 4.5.1)	$V_{BE(sat)2}$	0.65	0.90	V dc
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +150^\circ\text{C}$				
Collector to base cutoff current	3036	Bias condition D, $V_{CB} = -100$ V dc	I_{CBO3}		100	μA dc
Low-temperature operation:		$T_A = -55^\circ\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 10$ V dc, $I_C = 50$ mA dc	h_{FE6}			
2N3634, 2N3634L 2N3636, 2N3636L				25		
2N3635, 2N3635L 2N3637, 2N3637L				50		
<u>Subgroup 4</u>						
Small-signal short-circuit forward-current transfer ratio	3306	$V_{CE} = 30$ V dc, $I_C = 30$ mA dc, $f = 100$ MHz	$ h_{fe} $			
2N3634, 2N3634L 2N3636, 2N3636L				1.5	8.0	
2N3635, 2N3635L 2N3637, 2N3637L				2.0	8.5	
Small-signal short-circuit forward current transfer ratio	3206	$V_{CE} = 10$ V dc, $I_C = 10$ mA dc, $f = 1$ kHz	h_{fe}			
2N3634, 2N3634L 2N3636, 2N3636L				40	160	
2N3635, 2N3635L 2N3637, 2N3637L				80	320	
Small-signal short-circuit input impedance	3201	$V_{CE} = 10$ V dc, $I_C = 10$ mA dc, $f = 1$ kHz	h_{ie}			Ω
2N3634, 2N3634L 2N3636, 2N3636L				100	600	
2N3635, 2N3635L 2N3637, 2N3637L				200	1200	

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4 Continued</u>						
Small signal open circuit reverse voltage transfer ratio	3211	$V_{CE} = 10 \text{ V dc}$, $I_C = 10 \text{ mA dc}$, $f = 1 \text{ kHz}$	h_{re}		3×10^{-4}	
Small signal open circuit output admittance	3216	$V_{CE} = 10 \text{ V dc}$, $I_C = 10 \text{ mA dc}$, $f = 1 \text{ kHz}$	h_{oe}		200	μs
Open circuit output capacitance	3236	$V_{CB} = 20 \text{ V dc}$, $I_E = 0$, $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}		10	pF
Input capacitance (output open circuited)	3240	$V_{EB} = 1 \text{ V dc}$, $I_C = 0$, $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{ibo}		75	pF
Noise figure	3246	$V_{CE} = 10 \text{ V dc}$, $I_C = 0.5 \text{ mA dc}$, $R_G = 1 \text{ k}\Omega$ (see 4.5.4) $f = 100 \text{ Hz}$ $f = 1 \text{ kHz}$ $f = 10 \text{ kHz}$	NF		5 3 3	dB
Pulse response	3251	Test condition A				
Switching parameters			t_d			
Pulse delay time		See figure 3	t_r		100	ns
Pulse rise time		See figure 3	t_s		100	ns
Pulse storage time		See figure 3	t_f		500	ns
Pulse fall time		See figure 3	t_{off}		150	ns
t_{off}		t_s & t_f			600	ns
<u>Subgroup 5</u>						
Safe operating area (continuous dc)	3051	$T_C = +25^\circ\text{C}$, $t = 1\text{s}$, 1 cycle (see figure 4)				
<u>Test 1</u>						
2N3634, 2N3634L 2N3635, 2N3635L		$V_{CE} = 100 \text{ V dc}$, $I_C = 30 \text{ mA dc}$				
		$V_{CE} = 130 \text{ V dc}$, $I_C = 20 \text{ mA dc}$				
2N3636, 2N3636L 2N3637, 2N3637L						
<u>Test 2</u>						
		$V_{CE} = 50 \text{ V dc}$, $I_C = 95 \text{ mA dc}$				
<u>Test 3</u>						
		$V_{CE} = 5 \text{ V dc}$, $I_C = 1 \text{ A dc}$				
End-point electrical measurements		Subgroup 2.				

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 6</u> Not applicable						
<u>Subgroups 7</u> Decap internal visual (design verification)	2075	n = 1 device, c = 0				

1/ For sampling plan see MIL-PRF-19500.

2/ For resubmission of failed subgroup A1, double the sample size of the failed test or sequence of tests. A failure in group A, subgroup 1 shall not require retest of the entire subgroup. Only the failed test shall be rerun upon submission.

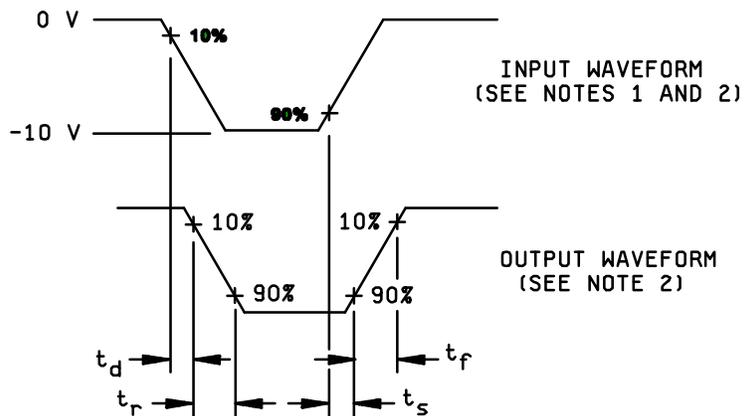
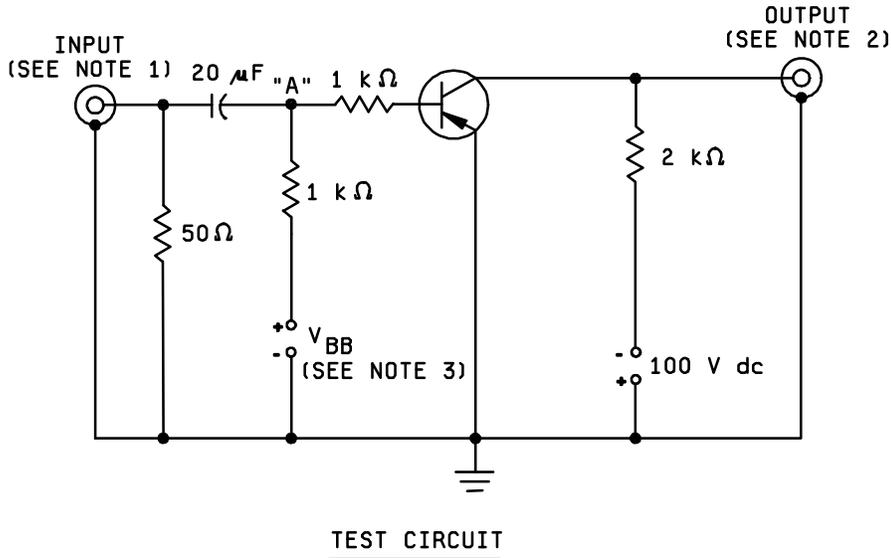
3/ Separate samples may be used.

4/ Not required for laser marked devices.

5/ Not required for JANS devices.

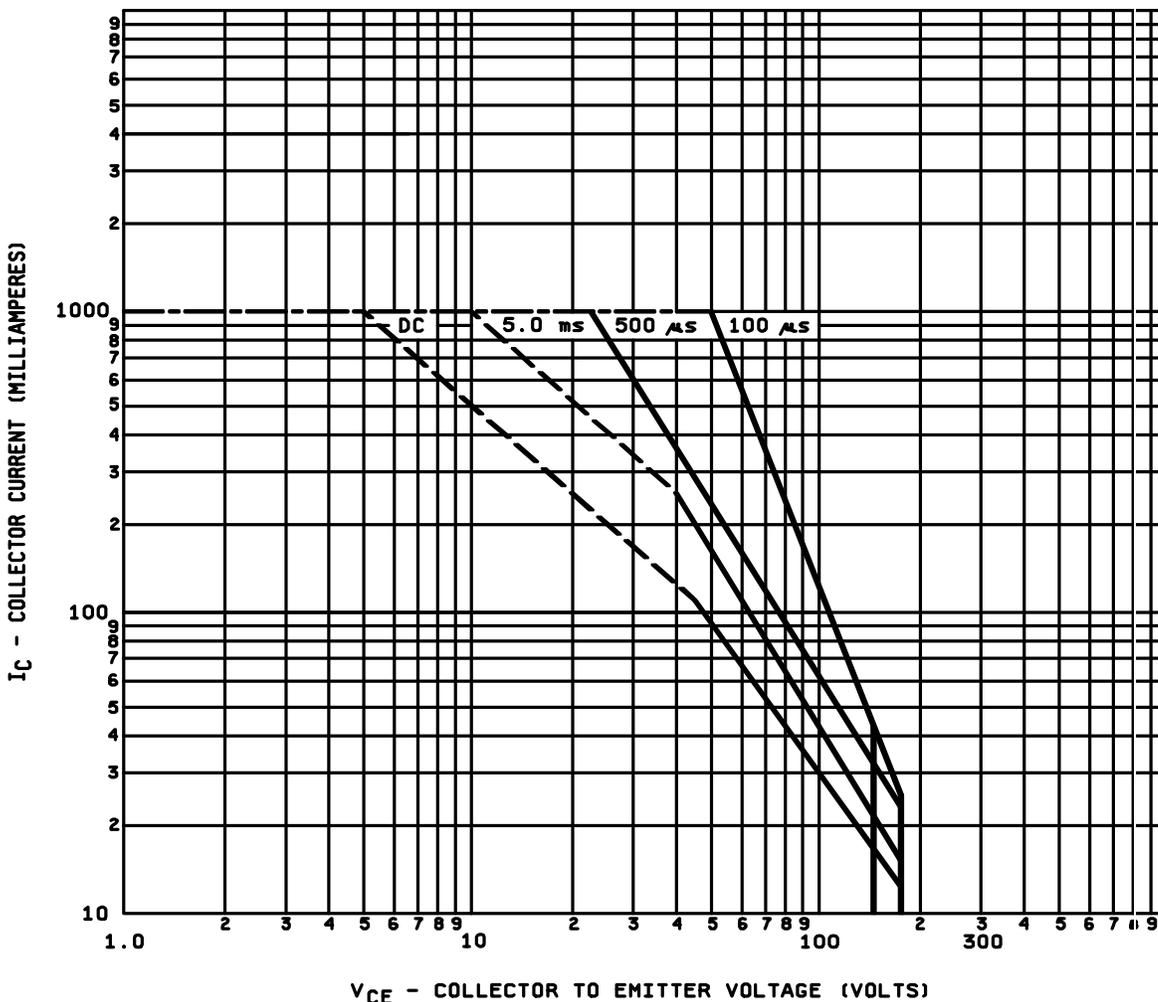
TABLE II. Group E inspection (all quality levels) - For qualification only

Inspection	MIL-STD-750		Qualification
	Method	Conditions	
<u>Subgroup 1</u> Temperature cycling (air to air)	1051	Test condition C, 500 cycles	12 devices c = 0
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See group A, subgroup 2 and 4.5.3 herein.	
<u>Subgroup 2</u> Intermittent life	1037	Intermittent operation life: $V_{CB} = 10$ V dc , 6,000 cycles, $\Delta T_J \geq +100^\circ\text{C}$; forced air cooling allowed on cooling cycle only.	45 devices c = 0
Electrical measurements			
<u>Subgroup 3, 4 and 5</u> Not applicable		See group A, subgroup 2 and 4.5.3 herein.	

**NOTES:**

1. The input waveform is supplied by a pulse generator with the following characteristics:
 $t_r \leq 15 \text{ ns}$, $t_f \leq 15 \text{ ns}$, $Z_{OUT} = 50 \Omega$, $PW = 20 \mu\text{s}$, duty cycle $\leq 2\%$
2. Output waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15 \text{ ns}$, $R_{in} \geq 10 \text{ M}\Omega$, $C_{in} \leq 11.5 \text{ pF}$
3. $V_{BB} = 4.0 \text{ V dc}$ for t_{on} , 4.1 for t_{off} at point "A".
4. Resistors shall be noninductive types.
5. The dc power supplies may require additional by-passing in order to minimize ringing.

FIGURE 3. Pulse response test circuit.



Legend:

- Specification Limit
- - - - - Thermal Limit $T_C = +25^\circ\text{C}$
(single pulse)
- Second Breakdown Limit

NOTES:

1. $T_J = +200^\circ\text{C}$.
2. Curves are based on a 30 percent derating factor.

FIGURE 4. Maximum safe operating area graph (continuous dc).

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 material 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.

5.2 Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-PRF-19500.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

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

6.2 Acquisition requirements. See 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 purchase 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, 3990 East Broad Street, Columbus, OH 43216-5000.

6.4 Changes from previous issue. Changes to this revision entailed addition of JANC die, only.

6.5 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA2N2369A) will be identified on the QPL.

JANC ordering information	
PIN	Manufacturer
	43611
2N3634	JANHCA2N3634, JANKCA2N3634
2N3635	JANHCA2N3635, JANKCA2N3635
2N3636	JANHCA2N3636, JANKCA2N3636
2N3637	JANHCA2N3637, JANKCA2N3637

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

Preparing activity:
 DLA - CC

(Project 5961-2287)

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

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INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/357F	2. DOCUMENT DATE
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3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, AMPLIFIER, TYPES 2N3634 THROUGH 2N3637, 2N3634L THROUGH 2N3637L, JAN, JANTX, JANTXV, JANS, JANHC AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION
---------------------------------------	-----------------

c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED
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8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial DSN FAX EMAIL 614-692-0510 850-0510 614-692-6939 alan_barone@dsc.dla.mil
------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------

c. ADDRESS Defense Supply Center Columbus, ATTN: DSCC-VAC, 3990 East Broad Street, Columbus, OH 43213-1999	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman, Suite 2533, Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888
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