

The documentation and process conversion measures necessary to comply with this revision shall be completed by 31 November 1998

INCH-POUND

MIL-PRF-19500/357E
31 August 1998
SUPERSEDING
MIL-S-19500/357D
31 December 1992

PERFORMANCE SPECIFICATION SHEET

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

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 device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (similar to TO-39, TO-5).

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}
	<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>
2N3634, 2N3634L	1	5	140	140	5	1	-65 to +200
2N3635, 2N3635L	1	5	140	140	5	1	-65 to +200
2N3636, 2N3636L	1	5	175	175	5	1	-65 to +200
2N3637, 2N3637L	1	5	175	175	5	1	-65 to +200

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 _{FE}		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	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2N3634, 2N3634L	25		45		50		50	150	30		1.5	8.0		10
2N3635, 2N3635L	55		90		100		100	300	60		2.0	8.5		10
2N3636, 2N3636L	25		45		50		50	150	30		1.5	8.0		10
2N3637, 2N3637L	55		90		100		150	300	60		2.0	8.5		10

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-VAT, 3990 East Broad St., Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FSC 5961

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 1/ $I_B = 1\text{ mA}$ dc	$I_C = 50\text{ mA}$ dc 1/ $I_B = 5\text{ mA}$ dc	$I_C = 10\text{ mA}$ dc 1/ $I_B = 1\text{ mA}$ dc	$I_C = 50\text{ mA}$ dc 1/ $I_B = 5\text{ mA}$ 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				0.65				
Maximum	0.3	0.6	0.8	0.90	100	100	500	100

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.

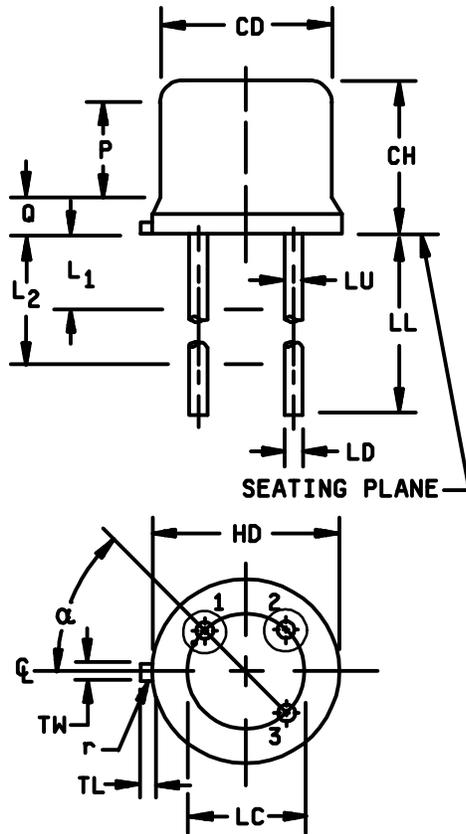
3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be specified in MIL-PRF-19500.

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.



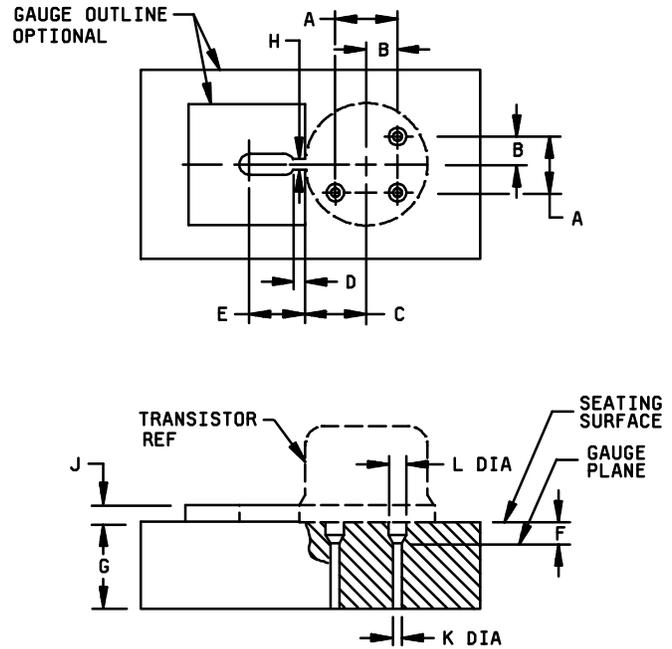
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TYP		5.08 TYP		7
LD	.016	.021	0.41	0.53	8
LL	See notes 7, 11, and 12				8
LU	.016	.019	0.41	0.48	8
L1		.050		1.27	8
L2	.250		6.35		8
P	.100		2.54		
Q		.050		1.27	
r		.010		0.018	9
TL	.029	.045	0.74	1.14	4
TW	.028	.034	0.72	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. 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).
5. TL measured from maximum HD.
6. CD shall not vary more than 0.010 inch (.25 mm) in zone P. This zone is controlled for automatic handling.
7. 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 the gauge and gauging procedure described on gauge drawing on figure 2.
8. LU applies between L1 and L2. LD applies between L2 and L minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
9. r (radius) applies to both inside corners of tab.
10. For transistor types 2N3634 through 2N3637, LL is 0.500 inch (12.70 mm) minimum, and 0.750 inch (19.50 mm) maximum.
11. For transistor types 2N3634L through 2N3637L, LL is 1.500 inches (38.10 mm) minimum, and 1.750 inches (44.45 mm) maximum.
12. In accordance with ANSI Y14.5M, diameters are equivalent to Nx symbology.

FIGURE 1. Dimensions and configuration.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.1409	.1419	3.579	3.604
B	.0702	.0712	1.783	1.809
C	.182	.199	4.62	5.05
D	.009	.011	0.23	0.28
E	.125 Nom		3.18 Nom	
F	.054	.055	1.37	1.40
G	.372	.378	9.45	9.60
H	.0350	.0355	0.889	0.902
J	.150 Nom		3.81 Nom	
K	.0325	.0335	0.826	0.851
L	.0595	.0605	1.511	1.537



NOTES:

1. Metric equivalents are given for general information only.
2. Dimensions are in inches.
3. The following gauging procedures shall be used: The use of a pin straightener prior to insertion in the gauge is permissible. The device being measured shall be inserted until its seating plane is 0.125 inch (3.18 mm) + 0.010 inch (0.254 mm) from the seating surface of the gauge. A spacer may be used to obtain the 0.125 inch (3.18 mm) distance from the gauge seat prior to force application. A force of $8 \pm .5$ oz. shall then be applied parallel and symmetrical to the device's cylindrical axis. When examined visually after the force application (the force need not be removed) the seating plane of the device shall be seated against the gauge.
4. The location of the tab locator, within the limits of dimension C, will be determined by the tab and flange dimension of the device being checked.

FIGURE 2. Gauge for lead and tab location.

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; $\Delta h_{FE5} = \pm 15$ 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. $\Delta h_{FE5} = \pm 15$ percent of initial value.	Subgroups 2 and 3 of table I herein; ΔI_{CBO2} = 100 percent of initial value or 10 nA dc, whichever is greater. $\Delta h_{FE5} = \pm 15$ percent of initial value.

4.3.1 Power burn-in test conditions and operation life test conditions. Power burn-in and operation life test conditions are as follows:
 T_A = Room ambient as defined in the general requirements of MIL-STD-750 (see 4.5).

JANS level (all device types): $V_{CB} = 10 - 30$ V dc, $P_T = 1.0$ W.

JANTX and JANTXV levels: $V_{CB} = 10 - 30$ V dc, $P_T = 1.0$ W.

NOTE: No heat sink or forced air cooling on the devices shall be permitted.

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 $Z_{\theta JX} (max) = 35^\circ C/W$.

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	$V_{CB} = 10 - 30 \text{ V dc}$; $P_T = 1.0 \text{ W}$ at $T_A = \text{Room ambient}$ as defined in the general requirements of MIL-STD-750 (see 4.5); $t_{on} = t_{off} = 3 \text{ minutes}$ minimum for 2,000 cycles. No heat sink or forced- air cooling on devices shall be permitted.
B5	1027	$V_{CB} = 10 - 30 \text{ V dc}$; $P_T = 600 \text{ mW}$ at $T_A = 100^\circ\text{C}$ for 96 hours, or $T_A = +125^\circ\text{C} \pm 25^\circ\text{C}$ for 96 hours with P_T adjusted according to the chosen T_A to give an average $T_J = +275^\circ\text{C}$.

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, $V_{CB} = 10 - 30 \text{ V d}$, $T_J = +150^\circ\text{C}$ minimum. No heat sink or forced- air cooling on devices shall be permitted. $n = 45$, $C = 0$.
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), $T_A = +200^\circ\text{C}$, $t = 340 \text{ hours}$, $n = 22$, $C = 0$.

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. 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. 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. Electrical measurements (end points) and delta requirements shall be in accordance with group A, subgroup 2 and 4.5.3 herein.

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; $T_J = +150^\circ\text{C}$ minimum. No heat sink or forced-air cooling on device shall be permitted.

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} 1/	100% of initial value or ± 20 nA dc, whichever is greater.	
2	Forward current transfer ratio	3076	$V_{CE} = 10$ V dc; $I_C = 50$ mA dc; pulsed see 4.5.1	Δh_{FE5} 1/	$\pm 25\%$ 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-		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1 2/</u>						
Visual and mechanical inspection <u>3/</u>	2071	n = 45 devices, c = 0				
Solderability <u>3/ 5/</u>	2026	n = 15 leads, c = 0				
Resistance to solvents <u>3/ 4/ 5/</u>	1022	n = 15 devices, c = 0				
Temp cycling <u>3/ 5/</u>	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal <u>5/</u> Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements <u>5/</u>		Group A, subgroup 2				
Bond strength <u>3/ 5/</u>	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}	10		μA dc
Emitter to base, cutoff current	3061	V _{BE} = 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		: A 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	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 0.1 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE1}			
2N3634, 2N3634L 2N3636, 2N3636L				25		
2N3635, 2N3635L 2N3637, 2N3637L				55		
Forward-current transfer ratio	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 1.0 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE2}			
2N3634, 2N3634L 2N3636, 2N3636L				45		
2N3635, 2N3635L 2N3637, 2N3637L				90		
Forward-current transfer ratio	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 10 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE3}			
2N3634, 2N3634L 2N3636, 2N3636L				50		
2N3635, 2N3635L 2N3637, 2N3637L				100		
Forward-current transfer ratio	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 50 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE4}			
2N3634, 2N3634L 2N3636, 2N3636L				50	150	
2N3635, 2N3635L 2N3637, 2N3637L				100	300	
Forward-current transfer ratio	3076	$V_{CE} = 10 \text{ V dc}$, $I_C = 150 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE5}			
2N3634, 2N3634L 2N3636, 2N3636L				30		
2N3635, 2N3635L 2N3637, 2N3637L				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	: A 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}			
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	: A dc
Open circuit output capacitance	3236	$V_{CB} = 20 \text{ V dc}$, $I_E = 10 \text{ mA dc}$, $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	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						ns
Pulse delay time		See figure 3	t_d		100	
Pulse rise time		See figure 3	t_r		100	
Pulse storage time		See figure 3	t_s		500	
Pulse fall time		See figure 3	t_f		150	
t_{off}		t_s & t_f	t_{off}		600	
<u>Subgroup 5 - Continued</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		$V_{CE} = 100 \text{ V dc}$, $I_C = 30 \text{ mA dc}$				
2N3636, 2N3636L 2N3637, 2N3637L		$V_{CE} = 130 \text{ V dc}$, $I_C = 20 \text{ mA dc}$				
<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.

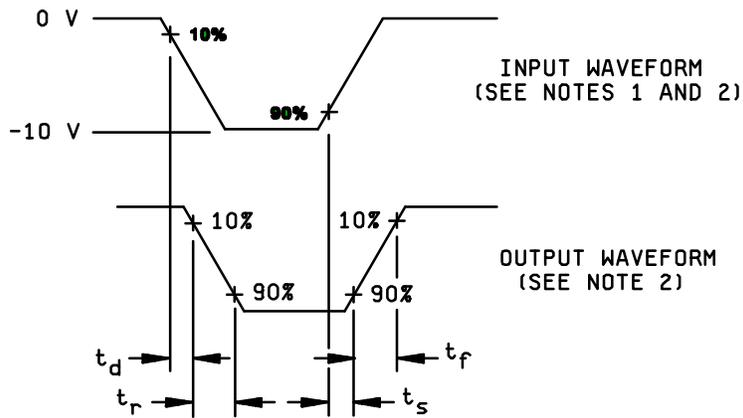
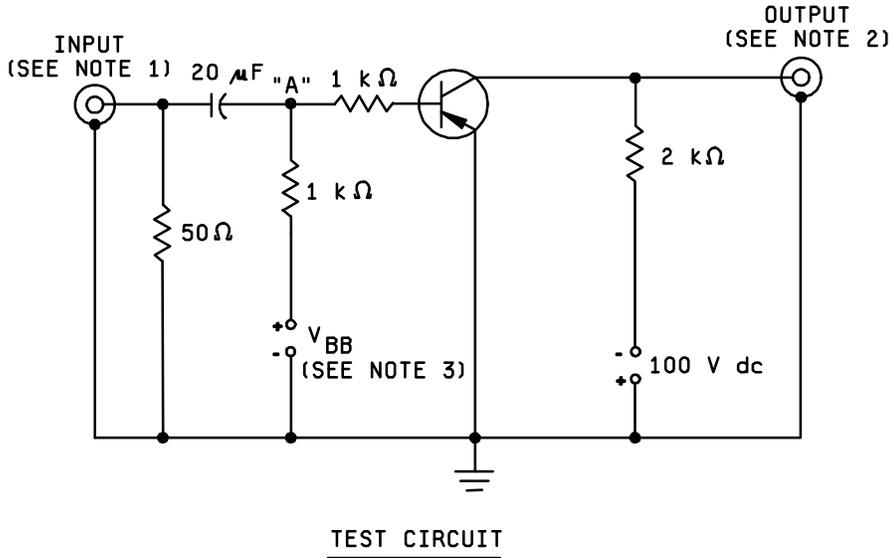
3/ Separate samples may be used.

4/ Not required for laser marked devices.

5/ Not required for JANS devices.

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

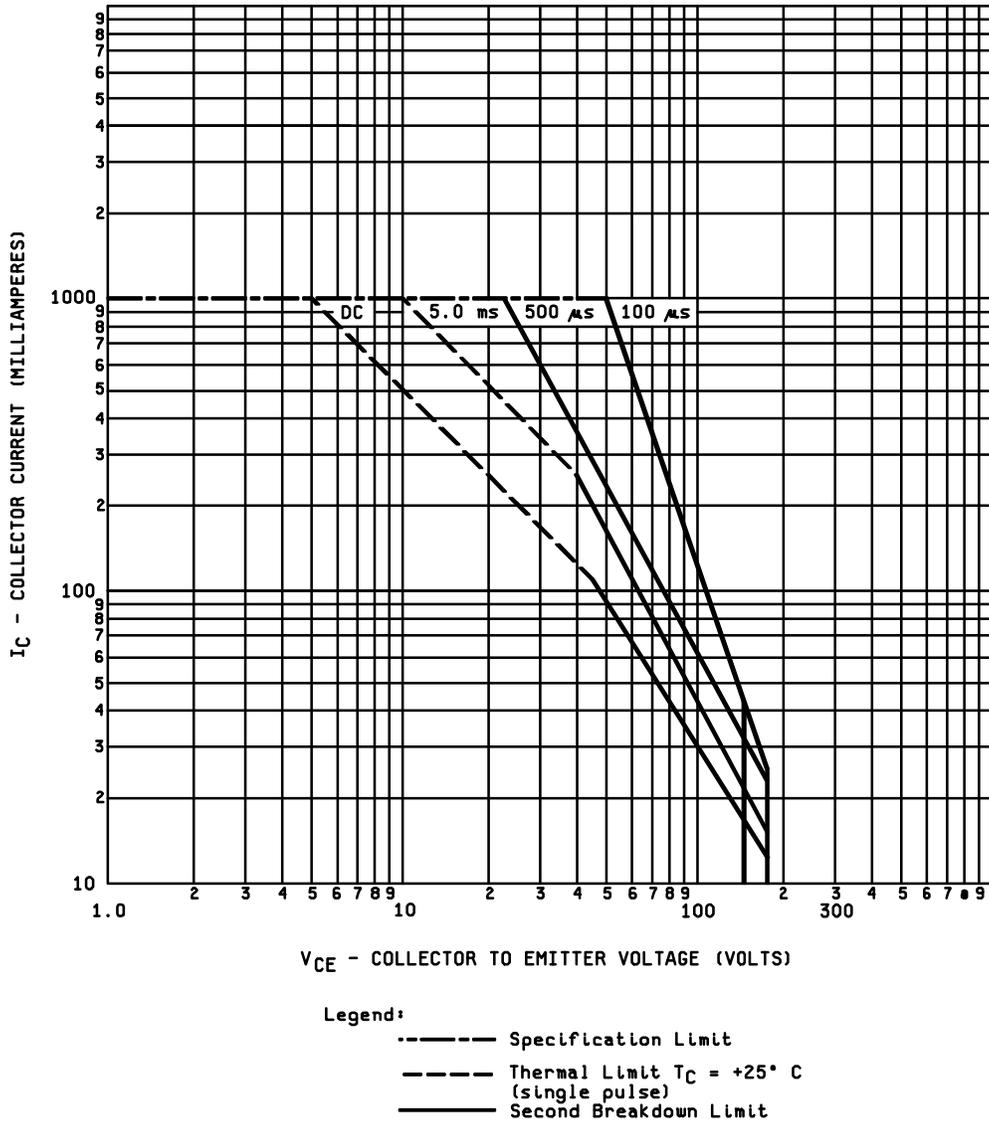
Inspection	MIL-STD-750		Qualification
	Method	Conditions	
<u>Subgroup 1</u>			12 devices c = 0
Temperature cycling (air to air)	1051	Test condition C, 500 cycles	
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See group A, subgroup 2 and 4.5.3 herein.	
<u>Subgroup 2</u>			45 devices c = 0
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.	
Electrical measurements		See group A, subgroup 2 and 4.5.3 herein.	
<u>Subgroup 3, 4 and 5</u>			
Not applicable			



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:
 $t_r \leq 15 \text{ ns}$, $R_{in} \geq 10 \text{ MS}$, $C_{in} \leq 11.5 \text{ pF}$
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.



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. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:
Army - CR
Navy - EC
Air Force - 17
NASA - NA

Preparing activity:
DLA - CC

(Project 5961-1925)

Review activities:
Army - AR, MI, SM
Navy - AS, CG, MC, SH
Air Force - 19, 85

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/357E	2. DOCUMENT DATE 980831
3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, AMPLIFIER TYPES 2N3634 THROUGH 2N3637, 2N3634L THROUGH 2N3637L JAN, JANTX, JANTXV, AND JANS		
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
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-VAT Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 DSN 289-2340	