

The documentation and process conversion measures necessary to comply with this revision shall be completed by 25 June 2002.

INCH-POUND

MIL-PRF-19500/253H
25 March 2002
SUPERSEDING
MIL-PRF-19500/253G
23 April 2001

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, LOW-POWER
TYPES 2N930 AND 2N930UB 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 NPN silicon, low-power transistors. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for die.

1.2 Physical dimensions. See figure 1 (TO-18), figure 2 (UB, surface mount), and figures 3 and 4 (die).

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

P_T (1) $T_A = +25^\circ\text{C}$	V_{CBO}	V_{CEO}	V_{EBO}	I_C	T_J and T_{STG}	$R_{\theta JC}$	$R_{\theta JA}$
<u>mW</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>mA dc</u>	<u>$^\circ\text{C}$</u>	<u>$^\circ\text{C/W}$</u>	<u>$^\circ\text{C/W}$</u>
360	60	45	6	30	-65 to +200	97	485

(1) Derate linearly at 2.06 mW/ $^\circ\text{C}$ above $T_A = +25^\circ\text{C}$.

1.4 Primary electrical characteristics.

Limits	h_{FE1} (1)	h_{FE2} (1)	C_{obo}	$ h_{fe} $	$V_{BE(SAT)}$ (1)	$V_{CE(SAT)}$ (1)
	$V_{CE} = 5\text{ V dc}$ $I_C = 10\text{ }\mu\text{A dc}$	$V_{CE} = 5\text{ V dc}$ $I_C = 500\text{ }\mu\text{A dc}$	$V_{CB} = 5\text{ V dc}$ $I_E = 0$ $100\text{ kHz} \leq f \leq 1\text{ MHz}$	$V_{CE} = 5\text{ V dc}$ $I_C = 500\text{ }\mu\text{A dc}$ $f = 30\text{ MHz}$	$I_C = 10\text{ mA dc}$ $I_B = 0.5\text{ mA dc}$	$I_C = 10\text{ mA dc}$ $I_B = 0.5\text{ mA dc}$
Min Max	100 300	150	<u>pF</u> 8.0	1.5 6.0	<u>V dc</u> 0.6 1.0	<u>V dc</u> 1.0

(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: Defense Supply Center, Columbus, ATTN: DSCC/VAC, Post Office Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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 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 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

DEPARTMENT OF DEFENSE

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

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Services (DAPS), Building 4D (DPM-DODSSP), 700 Robbins Avenue, 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.

3. REQUIREMENTS

3.1 General. The requirements for acquiring the product described herein shall consist of this document and MIL-PRF-19500.

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

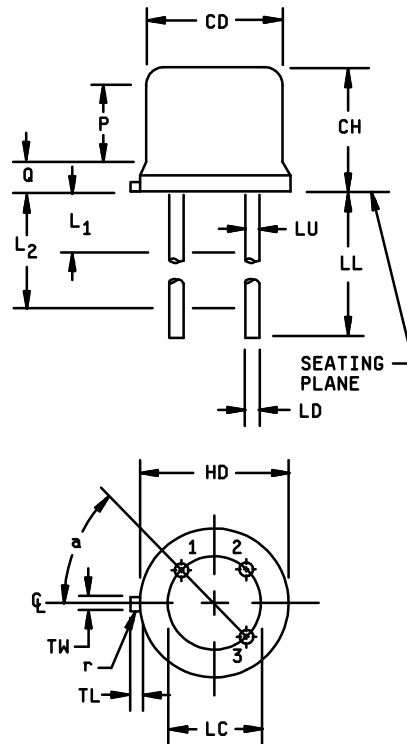
3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1 (T0-18), figure 2 (UB, surface mount) and figures 3 and 4 (die).

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. Devices shall be marked in accordance with MIL-PRF-19500.

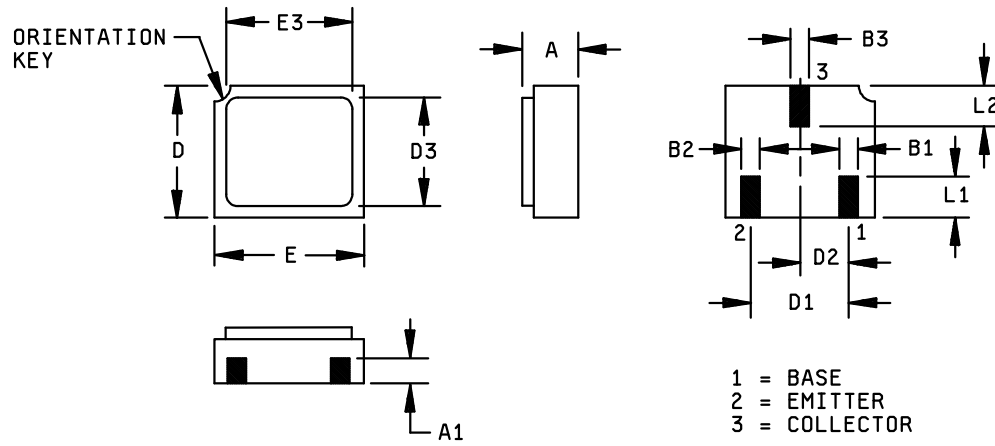
Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	
CH	.170	.210	4.32	5.33	
HD	.209	.230	5.31	5.84	
LC	.100 TP		2.54 TP		6
LD	.016	.021	0.41	0.53	7,8
LL	.500	.750	12.70	19.05	7,8
LU	.016	.019	0.41	0.48	7,8
L1		.050		1.27	7,8
L2	.250		6.35		7,8
P	.100		2.54		
Q		.030		0.76	5
TL	.028	.048	0.71	1.22	3,4
TW	.036	.046	0.91	1.17	3
r		.010		0.25	10
α	45° TP		45° TP		6



NOTES:

1. Dimension are in inches.
2. Metric equivalents are given for general information only.
3. Beyond r (radius) maximum, TL shall be held for a minimum length of .011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods.
7. Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
8. All three leads.
9. The collector shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ANSI Y14.5M, diameters are equivalent to ϕ x symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

FIGURE 1. Physical dimensions (similar to TO-18).

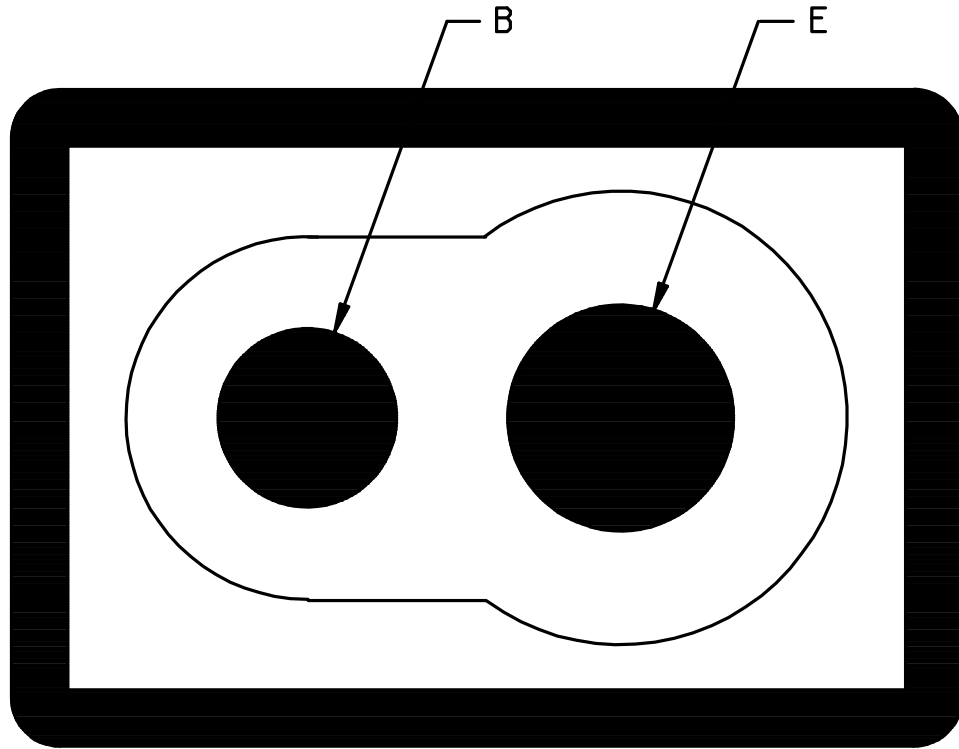


Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.046	.056	0.97	1.42	
A1	.017	.035	0.43	0.89	
B1	.016	.024	0.41	0.61	
B2	.016	.024	0.41	0.61	
B3	.016	.024	0.41	0.61	
D	.085	.108	2.41	2.74	
D1	.071	.079	1.81	2.01	
D2	.035	.039	0.89	0.99	
D3	.085	.108	2.41	2.74	
E	.115	.128	2.82	3.25	
E3		.128		3.25	
L1	.022	.038	0.56	0.96	
L2	.022	.038	0.56	0.96	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 2. Physical dimensions, surface mount (UB version).

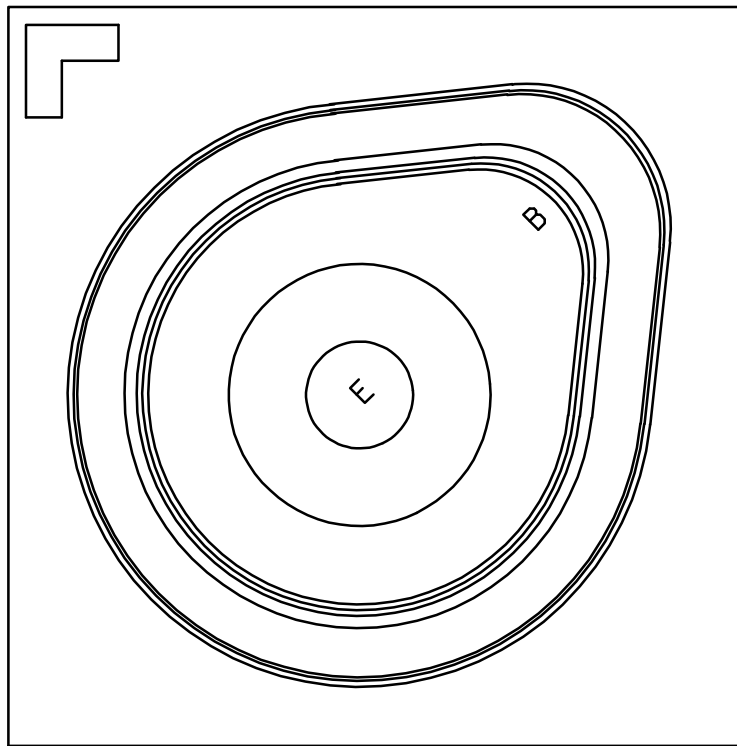


A- version

NOTES:

1. Chip size 15 x 19 mils \pm 1 mil.
2. Chip thickness..... 10 \pm 1.5 mil.
3. Top metal Aluminum 15,000Å minimum, 18,000Å nominal.
4. Back metal A. Gold 2,500Å minimum, 3,000Å nominal.
B. Eutectic Mount – No Gold.
5. Backside..... Collector.
6. Bonding pad B = 3 mils, E = 4 mils diameter.
7. Passivation..... Si₃N₄ (Silicon Nitride) 2 kÅ min, 2.2 kÅ nom.

FIGURE 3. Physical dimensions, JANHCA die.



B-version

Die size:	.018 x .018 inch (0.4572 x 0.4572 mm).
Die thickness:	.008 ±.0016 inch (0.2032 ±0.04064 mm).
Base pad:	.0025 inch (0.0635 mm) diameter.
Emitter pad:	.003 inch (0.0762 mm) diameter.
Back metal:	Gold, 6,500 ±1,950 Å.
Top metal:	Aluminum, 19,500 ±2,500 Å.
Back side:	Collector.
Glassivation:	SiO ₂ , 7,500 ±1,500 Å.

FIGURE 4. Physical dimensions, JANHCB and JANKCB die.

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

3.7 Electrical test requirements. The electrical test requirements shall be group A as specified herein.

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, II, and III).

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 qualification shall be performed herein for qualification or requalification only. In case qualification was awarded to a prior revision of the associated specification that did not request the performance of table II tests, the tests specified in table II herein shall be performed by the first inspection lot to this revision to maintain qualification.

* 4.3 Screening (JANS, JANTX and JANTXV levels only). 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 table IV of MIL-PRF-19500)	Measurement	Measurement
	JANS levels	JANTX and JANTXV levels
3c	Thermal impedance, method 3131 of MIL-STD-750.	Thermal impedance, method 3131 of MIL-STD-750.
9	I_{CBO2} , h_{FE2}	Not applicable
10	48 hours minimum	48 hours minimum
11	I_{CBO2} , h_{FE2} ΔI_{CBO2} = 100 percent of initial value or 5 nA dc, whichever is greater; Δh_{FE2} = ± 25 percent.	I_{CBO2} , h_{FE2}
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 5 nA dc, whichever is greater; Δh_{FE2} = ± 25 percent.	Subgroup 2 of table I herein; ΔI_{CBO2} = 100 percent of initial value or 5 nA dc, whichever is greater; Δh_{FE2} = ± 25 percent.

* 4.3.1 Power burn-in conditions. Power burn-in conditions are as follows: V_{CB} = 10 - 30 V dc; apply P_T = 360 mW dc. NOTE: No heat sink or forced air cooling on the devices shall be permitted.

4.3.2 Screening (JANH and JANKC). Screening of JANHC and JANKC die shall be in accordance with MIL-PRF-19500, "Discrete Semiconductor Die/Chip Lot Acceptance". Burn-in duration for the JANKC level follows JANS requirements; the JANHC follows JANTX requirements.

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 inspections 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 MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table VIa (JANS) of MIL-PRF-19500 and 4.4.2.1. Electrical measurements (end-points) and delta requirements shall be in accordance with group A, subgroup 2 and table III herein: delta requirements only apply to subgroups B4, and B5. 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 table III herein.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B4	1037	$V_{CB} = 10 \text{ V dc.}$
B5	1027	$V_{CB} = 10 \text{ V dc; } P_D \geq 100 \text{ percent of maximum rated } P_T \text{ (see 1.3). (NOTE: If a failure occurs, resubmission shall be at the test conditions of the original sample.)}$ Option 1: 96 hours min, sample size in accordance with table VIa of MIL-PRF-19500, adjust P_D or T_A to achieve $T_J = +275^\circ\text{C}$ minimum. Option 2: 216 hours min., sample size = 45, $c = 0$; adjust P_D or T_A to achieve $T_J = +225^\circ\text{C}$ minimum.

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

<u>Step</u>	<u>Method</u>	<u>Condition</u>
1	1039	Steady-state life: Test condition B, 340 hours, $V_{CB} = 10 - 30 \text{ V dc}$, power shall be applied to achieve $T_J = +150^\circ\text{C}$ minimum using a minimum power dissipation, $P_D = 75 \text{ percent of } P_T$ maximum rated as defined in 1.3 herein. No heat sink or forced-air cooling on the devices shall be permitted. $n = 45 \text{ devices, } c = 0$.
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), $t = 340 \text{ hours, } T_A = +200^\circ\text{C}$. $n = 22$, $c = 0$.

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. 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 tests and 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 table III herein; delta requirements only apply to subgroup C6.

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

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Test condition E (not applicable for UB devices).
C6	1026	1,000 hours at $V_{CB} = 10$ 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.

4.4.3.2 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 (not applicable for UB devices).
C5	3131	See 4.5.2.
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. When the final lead finish is solder or any plating prone to oxidation at high temperature, the samples for C6 life test may be pulled prior to the application of final lead finish. 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 appendix E, table IX of MIL-PRF-19500 and as specified herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3131 of MIL-STD-750 (for qualification only). The following details shall apply:

- a. Collector current magnitude during power applications shall be 28 mA dc minimum.
- b. Collector to emitter voltage magnitude ≥ 20 V dc.
- c. Reference temperature measuring point shall be the case.
- d. Reference point temperature shall be $+25^{\circ}\text{C} \leq T_R \leq +75^{\circ}\text{C}$ and recorded before the test is started.
- e. Mounting arrangement shall be with heat sink to case.
- f. Maximum limit shall be $R_{\theta JC} = 97^{\circ}\text{C/W}$.

MIL-PRF-19500/253H

TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u> <u>2/</u>						
Visual and mechanical examination <u>3/</u>	2071	n = 45 devices, c = 0				
Solderability <u>3/ 4/</u>	2026	n = 15 leads, c = 0				
Resistance to solvents <u>3/ 4/ 5/</u>	1022	n = 15 devices, c = 0				
Temperature cycling <u>3/ 4/</u>	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal <u>4/</u> Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements		Group A, subgroup 2				
Bond strength <u>3/ 4/</u>	2037	Precondition $T_A = +250^\circ\text{C}$ at t = 24 hrs or $T_A = 300^\circ\text{C}$ at t = 2 hrs n = 11 wires, c = 0				
Decap internal visual (design verification) <u>4/</u>	2075	n = 4 device, c = 0				
<u>Subgroup 2</u>						
Collector to base cutoff current	3036	Bias condition D, $V_{CB} = 60\text{ V dc}$	I_{CBO1}		10	$\mu\text{A dc}$
Emitter to base cutoff current	3061	Bias condition D, $V_{EB} = 6\text{ V dc}$	I_{EBO1}		10	$\mu\text{A dc}$
Breakdown voltage, collector to emitter	3011	Bias condition D; $I_C = 10\text{ mA dc}$; pulsed (see 4.5.1)	$V_{(BR)CEO}$	45		V dc
Collector to emitter cutoff current	3041	Bias condition C; $V_{CE} = 45\text{ V dc}$	I_{CES1}		2.0	nA dc
Collector to emitter cutoff current	3041	Bias condition C; $V_{CE} = 5\text{ V dc}$	I_{CEO}		2.0	nA dc
Emitter to base cutoff current	3061	Bias condition D; $V_{EB} = 5\text{ V dc}$	I_{EBO2}		5	nA dc

See footnotes at end of table.

TABLE I. Group A inspection – Continued.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> - continued.						
Collector to base cutoff current	3036	Bias condition D; $V_{CB} = 45 \text{ V dc}$	I_{CBO2}		10	nA dc
Forward-current transfer ratio	3076	$V_{CE} = 5 \text{ V dc}$; $I_C = 10 \text{ } \mu\text{A dc}$ Pulsed (see 4.5.1)	h_{FE1}	100	300	
Forward-current transfer ratio	3076	$V_{CE} = 5 \text{ V dc}$; $I_C = 500 \text{ } \mu\text{A dc}$ Pulsed (see 4.5.1)	h_{FE2}	150		
Forward-current transfer ratio	3076	$V_{CE} = 5 \text{ V dc}$; $I_C = 10 \text{ mA dc}$	h_{FE3}		600	
Collector-emitter saturation voltage	3071	$I_C = 10 \text{ mA dc}$; $I_B = 0.5 \text{ mA dc}$ pulsed (see 4.5.1)	$V_{CE(sat)}$		1.0	V dc
Base-emitter saturation voltage	3066	Test condition A; $I_C = 10 \text{ mA dc}$; $I_B = 0.5 \text{ mA dc}$; pulsed (see 4.5.1)	$V_{BE(sat)}$	0.6	1.0	V dc
<u>Subgroup 3</u>						
High temperature operation		$T_A = +150^{\circ}\text{C}$				
Collector to base cutoff current	3036	Bias condition C; $V_{CE} = 45 \text{ V dc}$ pulsed (see 4.5.1)	I_{CES2}		10	$\mu\text{A dc}$
Low temperature operation		$T_A = -55^{\circ}\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 5 \text{ V dc}$; $I_C = 10 \text{ } \mu\text{A dc}$	h_{FE4}	20		
<u>Subgroup 4</u>						
Small-signal short-circuit forward current transfer ratio	3206	$V_{CE} = 5 \text{ V dc}$; $I_C = 1 \text{ mA dc}$; $f = 1 \text{ kHz}$	h_{fe}	150	600	
Magnitude of small-signal short- circuit forward current transfer ratio	3306	$V_{CE} = 5 \text{ V dc}$; $I_C = 500 \text{ } \mu\text{A dc}$; $f = 30 \text{ MHz}$	$ h_{fe} $	1.5	6.0	
Open circuit output capacitance	3236	$V_{CB} = 5 \text{ V dc}$; $I_E = 0$; $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}		8	pF

See footnotes at end of table.

TABLE I. Group A inspection – Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u> - continued.						
Noise figure	3246	$V_{CE} = 5 \text{ V dc}; I_C = 10 \text{ } \mu\text{A dc}; R_g = 10 \text{ k}\Omega$	NF			
Test 1		$f = 100\text{Hz}$			5	dB
Test 2		$f = 1 \text{ kHz}$			3	dB
Test 3		$f = 10 \text{ kHz}$			3	dB
Small-signal open-circuit output admittance	3216	$V_{CB} = 5 \text{ V dc}; I_E = 1.0 \text{ mA dc}; f = 1 \text{ kHz}$	h_{oe}	0	1.0	mhos
Small-signal open-circuit reverse voltage transfer ratio	3211	$V_{CB} = 5 \text{ V dc}; I_E = 1.0 \text{ mA dc}; f = 1 \text{ kHz}$	h_{re}		6×10^{-4}	
Small-signal short-circuit input impedance	3201	$V_{CB} = 5 \text{ V dc}; I_E = 1.0 \text{ mA dc}; f = 1 \text{ kHz}$	h_{ie}	25	32	Ω
<u>Subgroups 5 and 6</u>						
Not applicable						

1/ For sampling plan, unless otherwise specified, 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 JANS devices.

5/ Not required for laser marked devices.

TABLE II. Group E inspection (all quality levels) – for qualification only.

*

Inspection	MIL-STD-750		Qualification
	Method	Conditions	
<u>Subgroup 1</u>			45 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 table III herein.	
<u>Subgroup 2</u>			45 devices c = 0
Intermittent life	1037	V _{CB} = 10 V dc, 6,000 cycles.	
Electrical measurements		See group A, subgroup 2 and table III herein.	
<u>Subgroup 3</u>			
Not applicable			
<u>Subgroups 4, 5, 6 and 7</u>			
Not applicable			
<u>Subgroup 8</u>			45 devices c = 0
Reverse stability	1033	Condition A for devices ≥ 400 V. Condition B for devices < 400 V.	

TABLE III. Groups B, C, and E delta measurements.

*

Step	Inspection	MIL-STD-750		Symbol	Limit	Unit
		Method	Conditions			
1	Collector-base cutoff current	3036	Bias condition D, $V_{CB} = 45 \text{ V dc}$	ΔI_{CB02} <u>1/</u>	100 percent of initial value or 5 nA dc, whichever is greater.	
2	Forward current transfer ratio	3076	$V_{CE} = 5 \text{ V dc}$; $I_C = 500 \mu\text{A dc}$; pulsed see 4.5.1.	Δh_{FE2} <u>1/</u>	± 25 percent change from initial reading.	

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

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 personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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 must specify the following:

- Title, number, and date of this specification.
- Issue of DoDISS to be cited in the solicitation and if required, the specific issue of individual documents referenced (see 2.2.1).
- The lead finish as specified (see 3.4.1).
- Type designation and quality assurance level.
- Packaging requirements (see 5.1).

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) 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 43216-5000.

6.4 Suppliers of JANHC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example JANHCA2N930) will be identified on the QML.

JANC ordering information		
PIN	Manufacturer	
	43611	34156
2N930	JANHCA2N930	JANHCB2N930 JANKCB2N930

6.5 Changes from previous issue. The margins of this revision are marked with an asterisk 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 activities:
DLA – CC

(Project 5961-2506)

Review activities:

Army - AR, AV, MI, SM
Navy - AS
Air Force – 71, 99

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.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-PRF-19500/253H

2. DOCUMENT DATE
25 March 2002

3. DOCUMENT TITLE

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, LOW-POWER TYPES 2N930 AND 2N930UB 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

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@dscclia.mil

c. ADDRESS
Defense Supply Center, Columbus
ATTN: DSCC-VAC, P.O. Box 3990
Columbus, OH 43216-5000

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