The documentation and process conversion measures necessary to comply with this revision shall be completed by 31 November 2000.

INCH-POUND

MIL-PRF-19500/376E
31 August 2000
SUPERSEDING
MIL-PRF-19500/376D
21 August 1998

PERFORMANCE SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, LOW-POWER
TYPES 2N2484, 2N2484UA, 2N2484UB, 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 is 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 (similar to T0-18), figures 2 and 3 (surface mount case outlines UA and UB), and figures 4 and 5 (die).

1.3 Maximum ratings.

Types	P_T	V_{CBO}	V_{EBO}	V_{CEO}	I_C	T_J and T_{STG}	$R_{\theta JA}$	$R_{\theta JC}$
	T_A = +25°C							
	mW	V dc	V dc	V dc	mA dc	°C	°C/W	°C/W
2N2484	500 (1)	60	6	60	50	-65 to +200	325	146
2N2484UA	650 (2)	60	6	60	50	-65 to +200	210	160
2N2484UB	500 (1)	60	6	60	50	-65 to +200	325	146

(1) Derate linearly at 3.08 mW/°C above T_A = +37.5°C
(2) Derate linearly at 4.76 mW/°C above T_A = +63.5°C.

1.4 Primary electrical characteristics.

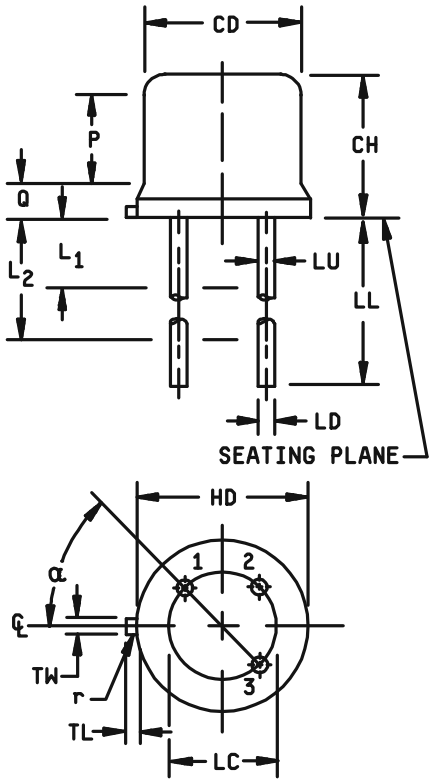
Limits	h_{fe}	C_{obo}	$\|h_{fe}\|2$	$V_{CE(sat)}$ (1)
	V_{CE} = 5 V dc I_C = 1 mA dc f = 1 kHz	I_E = 0 V_{CB} = 5 V dc 100 kHz ≤ f ≤ 1 MHz	I_C = 500 µA dc V_{CE} = 5 V dc f = 30 MHz	I_C = 1.0 mA dc I_B = 0.1 mA dc
		pF		V dc
Min	250		2.0	
Max	900	5.0	7.0	0.3

(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.

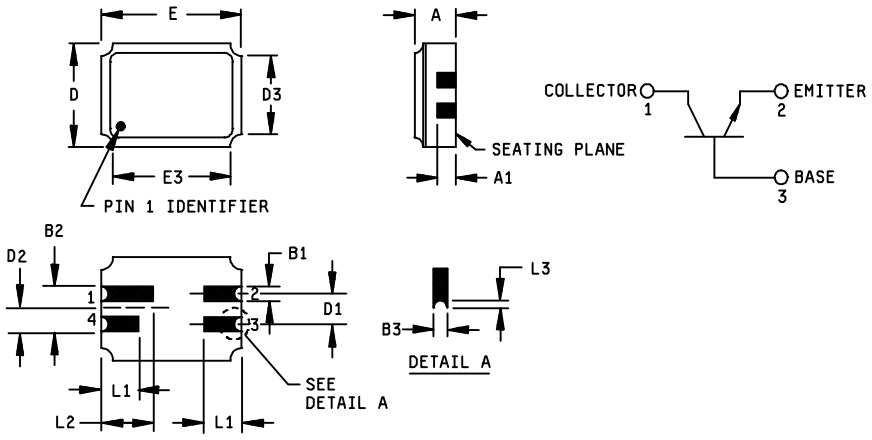
AMSC N/A FSC 5961
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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
Q	---	.040	---	0.86	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, 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. 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.
7. Dimension LU applies between L_1 and L_2. Dimension LD applies between L_2 and LL minimum. Diameter is uncontrolled in L_1 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 ϕx symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

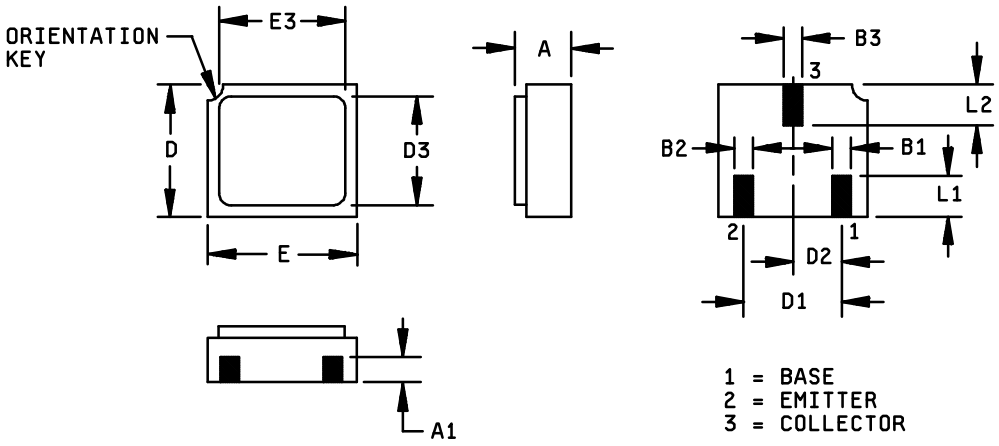
FIGURE 1. Physical dimensions (similar to TO-18).



Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.061	.075	1.55	1.90	3
A1	.029	.041	0.74	1.04	
B1	.022	.028	0.56	0.71	
B2	.075 REF		1.91 REF		
B3	.006	.022	0.15	0.56	5
D	.145	.155	3.68	3.93	
D1	.045	.055	1.14	1.39	
D2	.0375 BSC		.952 BSC		
D3	---	.155	---	3.93	
E	.215	.225	5.46	5.71	
E3	---	.225	---	5.71	
L1	.032	.048	0.81	1.22	
L2	.072	.088	1.83	2.23	
L3	.003	.007	0.08	0.18	5

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension "A" controls the overall package thickness. When a window lid is used, dimension "A" must increase by a minimum of .010 inch (0.254 mm) and a maximum of .040 inch (1.020 mm).
4. The corner shape (square, notch, radius, etc.) may vary at the manufacturer's option, from that shown on the drawing.
5. Dimensions "B3" minimum and "L3" minimum and the appropriately castellation length define an unobstructed three-dimensional space traversing all of the ceramic layers in which a castellation was designed. (Castellations are required on bottom two layers, optional on top ceramic layer.) Dimension "B3" maximum and "L3" maximum define the maximum width and depth of the castellation at any point on its surface. Measurement of these dimensions may be made prior to solder dipping.
6. Lead 4 = no connection.

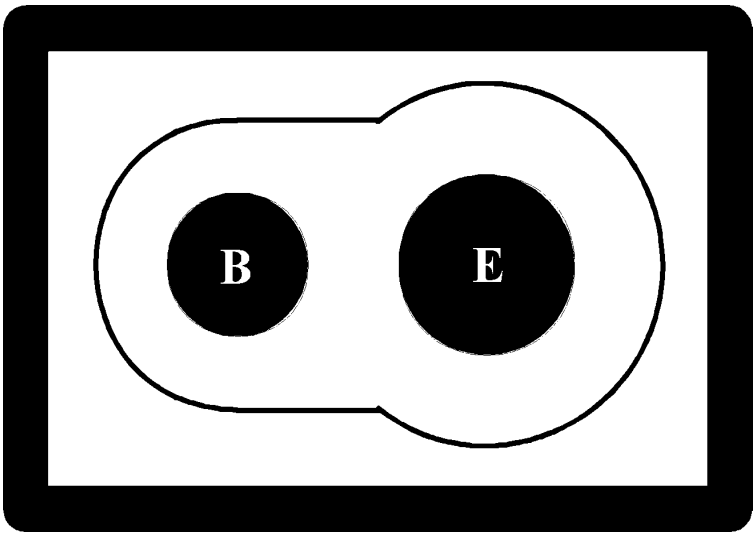
FIGURE 2. Physical dimensions, surface mount (2N2484UA).



Ltr	Dimensions				Notes
	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	3
D	.085	.108	2.41	2.74	
D1	.071	.079	1.81	2.01	
D2	.035	.039	0.89	0.99	
D3					
E	.115	.128	2.82	3.25	
E3					
L1	.022	.038	0.56	0.96	4

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions B2 and B3 are identical to B1
4. Dimension L2 is identical to L1.

FIGURE 3. Physical dimensions, surface mount (2N2484UB).

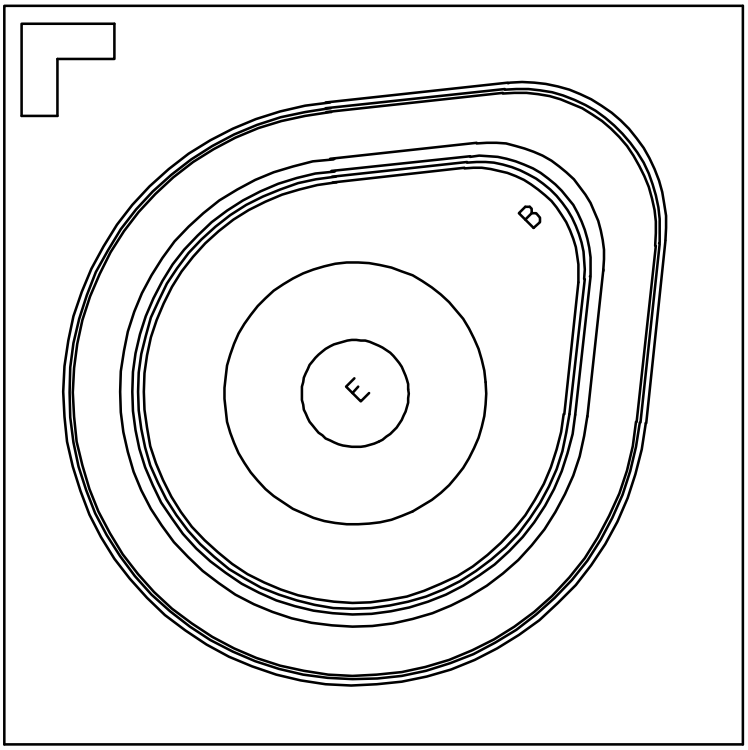


A- version

NOTES:

1. Die size ..... 0.015 x 0.019 inches ± 0.001 inch
2. Die thickness ..... 0.010 ± 0.0015 inches
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 = 0.003 inches, E = 0.004 inches diameter
7. Passivation ..... Si_3N_4 (Silicon Nitride) 2kÅ min, 2.2kÅ nom.

FIGURE 4. Physical dimensions, JANHC and JANKC die, A - version.



B - version

Die size:.....0.018 x 0.018 inches
Die thickness: .....0.008 ± 0.0016 inches
Base pad: .....0.0025 inches diameter
Emitter pad: .....0.003 inches diameter
Back metal:.....Gold, 6500 ± 1950 Å
Top metal: .....Aluminum, 19500 ± 2500 Å
Back side:.....Collector
Glassivation:.....SiO2, 7500 ± 1500 Å

FIGURE 5. Physical dimensions, JANHC and JANKC die, B - version.

1.4 Primary electrical characteristics.

	NF I_C = 10 µA dc, V_{CE} = 5 V dc R_g = 10 kΩ			h_{FE2}	h_{FE5}
	f = 100 Hz	f = 1000 Hz	f = 10 kHz	V_{CE} = 5 V dc I_C = 10 µA dc	V_{CE} = 5 V dc I_C = 1 mA dc
	dB	dB	dB		
Min				200	250
Max	7.5	3	2	500	800

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. The interface and physical dimensions shall be as specified in MIL-PRF-19500 and figures 1, 2, 3, 4, and 5 herein.

3.4.1 Lead finish. Unless otherwise specified, lead finish shall be solderable in accordance with MIL-PRF-19500, and herein.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500. At the option of the manufacturer, marking may be omitted from the body, but shall be retained on the initial container.

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

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I 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).

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

4.2.1. JANHC and JANKC Qualification. JANHC and JANKC qualification inspection shall be in accordance with MIL-PRF-19500.

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	
	JANS level	JANTX and JANTXV levels
3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	I_{CBO2}, h_{FE4}	Not applicable
10	48 hours minimum	48 hours minimum
11	I_{CBO2}; h_{FE4}; ΔI_{CBO2} = 100% of initial value or 2 nA dc, whichever is greater. Δh_{FE4} = ±15%	I_{CBO2} ,h_{FE4}
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% of initial value or 2 nA dc, whichever is greater; Δh_{FE4} = ±15%	Subgroup 2 of table I herein; ΔI_{CBO2} = 100% of initial value or 2 nA dc, whichever is greater; Δh_{FE4} = ±25%

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows: V_{CB} = 10 to 30 V dc:

Power shall be applied to achieve T_J = 135°C minimum and a minimum power dissipation = 75 percent of maximum rated P_T (see 1.3). T_A = room ambient as defined in 4.5 of MIL-STD-750.

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 method 3131 of MIL-STD-750.

a. I_M measurement current ----------5 mA.

b. I_H forward heating current ----------50 mA (min).

c. t_H heating time ----------25 - 30 ms.

d. t_{md} measurement delay time ------60 µs max.

e. V_{CE} collector-emitter voltage ------10 V dc minimum.

The maximum limit for $Z_{\theta JX}$ under these test conditions are $Z_{\theta JX}$ (max) = 150°C/W for 2N2484, $Z_{\theta JX}$ (max) = 67°C/W for 2N2484UA and 2N2484UB.

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 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. Electrical measurements (end-points) shall be in accordance with group A, subgroup 2 herein. Delta requirements shall be in accordance with table III 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 herein. Delta requirements shall be after each step and shall be in accordance with table III herein.

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

Subgroup	Method	Condition
B4	1037	V_{CB} = 10 V dc
B5	1027	V_{CB} = 10 V dc; T_A = +125°C ±25°C for 96 hours with P_T adjusted according to the chosen T_A to give T_J = +275°C minimum. Optionally, the test may be conducted for minimum 216 hours with P_T adjusted to achieve T_J = 225°C minimum, sample size (for option) n = 45, c = 0. In this case, the ambient temperature shall be adjusted such that a minimum 75 percent of maximum rated P_T (see 1.3) is applied to the device under test. (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). 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.

Step	Method	Condition
1	1039	Steady-state life: Test condition B, 340 hours, V_{CB} = 10 -30 V dc, T_J = 150°C min., external heating of the device under test to achieve T_J = +150°C minimum is allowed provided that a minimum of 75% of rated power is dissipated. No heat sink or forced-air cooling on the devices shall be permitted. n = 45 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 hours, T_A = +200°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 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) shall be in accordance with group A, subgroup 2 herein. Delta requirements shall be in accordance with table III herein.

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

Subgroup	Method	Condition
C2	2036	Test condition E (not applicable to UA and UB suffix devices).
C6	1026	1,000 hours at V_{CB} = 10 -30 V dc; power shall be applied to achieve T_J = 150°C minimum and a minimum power dissipation P_D = 75 percent of maximum rated P_T as defined in 1.3 herein.

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 (not applicable to UA and UB suffix devices).
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 re-qualification 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.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 1 2/						
Visual and mechanical examination 3/	2071	n = 45 devices, c = 0				
Solderability 3/ 4/	2026	n = 15 leads, c = 0				
Resistance to solvents 3/ 4/ 5/	1022	n = 15 devices, c = 0				
Temperature cycling 3/ 4/	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal 4/ Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements 4/		Group A, subgroup 2				
Bond strength 3/ 4/	2037	Precondition T_A = +250°C at t = 24 hrs or T_A = 300°C at t = 2 hrs; n = 11 wires, c = 0				
Subgroup 2						
Collector to emitter breakdown voltage	3011	Bias condition D; I_C = 10 mA dc pulsed (see 4.5.1)	$V_{(BR)CEO}$	60		V dc
Collector to base cutoff current	3036	Bias condition D; V_{CB} = 60 V dc	I_{CBO1}		10	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 6 V dc	I_{EBO1}		10	µA dc
Collector to base cutoff current	3036	Bias condition D; V_{CB} = 45 V dc	I_{CBO2}		5	nA dc
Collector to emitter cutoff current	3041	Bias condition D; V_{CE} = 5 V dc	I_{CEO}		2	nA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 5 V dc	I_{EBO2}		2	nA dc
Collector to emitter cutoff current	3041	Bias condition C; V_{CE} = 45 V dc	I_{CES}		5	nA dc
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 1 µA dc	h_{FE1}	45		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 2 - continued.						
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 10 µA dc	h_{FE2}	200	500	
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 100 µA dc	h_{FE3}	225	675	
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 500 µA dc	h_{FE4}	250	800	
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 1 mA dc	h_{FE5}	250	800	
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 10 mA dc pulsed (see 4.5.1)	h_{FE6}	225	800	
Collector to emitter voltage (saturated)	3071	I_C = 1.0 mA dc; I_B = 100 µA dc	$V_{CE(sat)}$		0.3	V dc
Base emitter voltage (nonsaturated)	3066	Test condition B; V_{CE} = 5 V dc; I_C = 100 µA dc	$V_{BE(ON)}$	0.5	0.7	V dc
Subgroup 3						
High-temperature operation		T_A = +150°C				
Collector to base cutoff current	3036	Bias condition D; V_{CB} = 45 V dc	I_{CBO3}		10	µA dc
Low-temperature operation		T_A = -55°C				
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 10 µA dc	h_{FE7}	35		
Subgroup 4						
Magnitude of common emitter small-signal short-circuit forward-current transfer ratio	3306	V_{CE} = 5 V dc; I_C = 50 µA dc; f = 5 MHz	$\|h_{fe}\|1$	3.0		
Magnitude of common emitter small-signal short-circuit forward- current transfer ratio	3306	V_{CE} = 5 V dc; I_C = 500 µA dc; f = 30 MHz	$\|h_{fe}\|2$	2.0	7.0	
Small-signal open-circuit output admittance	3216	V_{CE} = 5 V dc; I_C = 1.0 mA dc; f = 1 kHz	h_{oe}		40	µmhos
Small-signal open- circuit reverse-voltage transfer ratio	3211	V_{CE} = 5 V dc; I_C = 1.0 mA dc; f = 1 kHz	h_{re}		8.0×10^{-4}	
Small-signal short- circuit input impedance	3201	V_{CE} = 5 V dc; I_C = 1 mA dc; f = 1 kHz	h_{ie}	3.5	24	kΩ

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 4 - continued.						
Small-signal short- circuit forward current transfer ratio	3206	V_{CE} = 5 V dc; I_C = 1 mA dc; f = 1 kHz	h_{fe}	250	900	
Open circuit output capacitance	3236	V_{CB} = 5 V dc; I_E = 0; 100 kHz ≤ f ≤ 1 MHz	C_{obo}		5.0	pF
Input capacitance (output open-circuited)	3240	V_{EB} = 0.5 V dc; I_C = 0; 100 kHz ≤ f ≤ 1 MHz	C_{ibo}		6.0	pF
Noise figure	3246	f = 100 Hz; V_{CE} = 5 V dc; I_C = 10 μA dc; R_g = 10 kΩ;	NF1		7.5	dB
Noise figure	3246	f = 1 kHz; V_{CE} = 5 V dc; I_C = 10 μA dc; R_g = 10 kΩ;	NF2		3	dB
Noise figure	3246	f = 10 kHz; V_{CE} = 5 V dc; I_C = 10 μA dc; R_g = 10 kΩ;	NF3		2	dB
Noise figure (wideband)	3246	Noise bandwidth = 10 Hz to 15.7 kHz; V_{CE} = 5 V dc; I_C = 10 μA dc; R_g = 10 kΩ;	NF4		3	dB
Subgroups 5 and 6						
Not applicable						
Subgroup 7 4/						
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 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	
Subgroup 1			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 table III herein.	
Subgroup 2			45 devices c = 0
Intermittent life	1037	Intermittent operation life: V_{CB} = 10 V dc , 6,000 cycles.	
Electrical measurements		See group A, subgroup 2 and table III herein.	
Subgroup 3			
Not applicable			
Subgroup 4			
Not applicable			
Subgroup 5			
Not applicable			

TABLE III. Groups B and C delta measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limit	Unit
		Method	Conditions			
1	Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 500 µA dc; pulsed see 4.5.1	4/ Δh_{FE4}	±25 percent change from initial recorded reading	
2.	Collector to emitter voltage (saturated)	3071	I_C = 1.0 mA dc; I_B = 100 µA dc	$\Delta V_{CE(sat)}$ 4/ 5/	±50 mV dc change from previously measured value.	
3.	Collector to emitter cutoff current	3041	Bias condition C; V_{CB} = 45 V dc	ΔI_{CES} 4/	100 percent of initial value or 2 nA dc, whichever is greater.	

1/ The delta measurements for group B, table VIa (JANS) of MIL-PRF-19500 are as follows:
   a. Subgroup 4, see table III herein, step 2.
   b. Subgroup 5, see table III herein, steps 1 and 3.

2/ The delta measurements for 4.4.2.2 herein (group B, JAN, JANTX, and JANTXV) are as follows: Steps 2 and 3 of table III shall be performed after each step in 4.4.2.2 herein.

3/ The delta measurements for group C, table VII of MIL-PRF-19500 are as follows: Subgroup 6, see table III herein, steps 1 and 3 for JANS, step 1 for JAN, JANTX, and JANTXV.

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

5/ Applies to JANS level only.

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 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.

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. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1).

c. Lead formation and finish may be specified (see 3.4.1).

d. Type designation and product assurance level.

e. 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-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 43216-5000.

6.4 Suppliers of JANHC die. The qualified JANHC suppliers with the applicable letter version (example JANHCA1N645-1) will be identified on the QML.

JANC ordering information		
PIN	Manufacturer	
	43611	34156
2N2484	JANHCA2N2484 JANKCA2N2484	JANHCB2N2484 JANKCB2N2484

6.5 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.

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

Review activities:
Army - AR, MI, SM
Navy - AS, CG, MC, SH
Air Force - 13, 19

Preparing activity:
DLA - CC

(Project 5961-2309)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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-19500/376E	2. DOCUMENT DATE 31 August 2000

3. **DOCUMENT TITLE**
SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, LOW-POWER TYPES 2N2484, 2N2484UA, 2N2484UB, 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: 614-692-0510 DSN: 850-0510 FAX: 614-692-6939 EMAIL: alan_barone@dscc.dla.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

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