The documentation and process conversion measures necessary to comply with this revision shall be completed by 20 July 2000.

INCH-POUND

MIL-PRF-19500/393C
20 April 2000
SUPERSEDING
MIL-PRF-19500/393B
29 June 1999

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON POWER
TYPES 2N3418, 2N3418S, 2N3419, 2N3419S, 2N3420, 2N3420S, 2N3421, 2N3421S
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, transistors for use in medium power switching applications. Four levels of product assurance are provided for each device type, and two levels of product assurance for die (element evaluation) are provided, as specified in MIL-PRF-19500.

1.2. Physical dimensions. See figure 1 (similar to TO-5 for long leaded devices and TO-39 for short leaded devices) and figures 2, and 3 for JANHC and JANKC (die) dimensions.

1.3. Maximum ratings.

Type	P_T T_A = +25°C Note 1	P_T T_C = +100°C Note 2	V_{CBO}	V_{CEO}	V_{EBO}	I_C	I_C Note 3	T_{STG} and T_{OP}
	W	W	V dc	V dc	V dc	A dc	A dc	°C
2N3418, 2N3418S	1.0	15	85	60	8	3	5	-65 to +200
2N3419, 2N3419S	1.0	15	125	80	8	3	5	-65 to +200
2N3420, 2N3420S	1.0	15	85	60	8	3	5	-65 to +200
2N3421, 2N3421S	1.0	15	125	80	8	3	5	-65 to +200

Notes

1/ Derate linearly at 5.72 mW/°C above T_A > +25°C.
2/ Derate linearly at 150 mW/°C above T_C > +100°C.
3/ This value applies for $t_P \leq 1$ ms, duty cycle ≤ 50 %.

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, 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.

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

Limits	h_{FE2} 1/		h_{FE4} 1/		$V_{CE(sat)1}$ 1/	$V_{BE(sat)1}$	$\|h_{fe}\|$	C_{obo}	$R_{\theta JC}$
	V_{CE} = 2 V dc I_C = 1 A dc		V_{CE} = 5 V dc I_C = 5 A dc		I_C = 1 A dc I_B = 0.1 A dc	I_C = 1 A dc I_B = 0.1 A dc	V_{CE} = 10 V dc I_C = 0.1 A dc f = 20 MHz	V_{CB} = 10 V dc I_E = 0 100 kHz ≤ f ≤ 1 MHz	
	2N3418 2N3418S 2N3419 2N3419S	2N3420 2N3420S 2N3421 2N3421S	2N3418 2N3418S 2N3419 2N3419S	2N3420 2N3420S 2N3421 2N3421S	V dc	V dc		pF	°C/W
Min	20	40	10	15	---	0.6	1.3	---	---
Max	60	120	---	---	0.25	1.2	8	150	6.67

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. 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.

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-6100 - List of Case Outlines and Dimensions for Discrete Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation Production Services, 700 Robbins Avenue, Building 4D (DPM-DODSSP), Philadelphia, PA 19111-5094.)

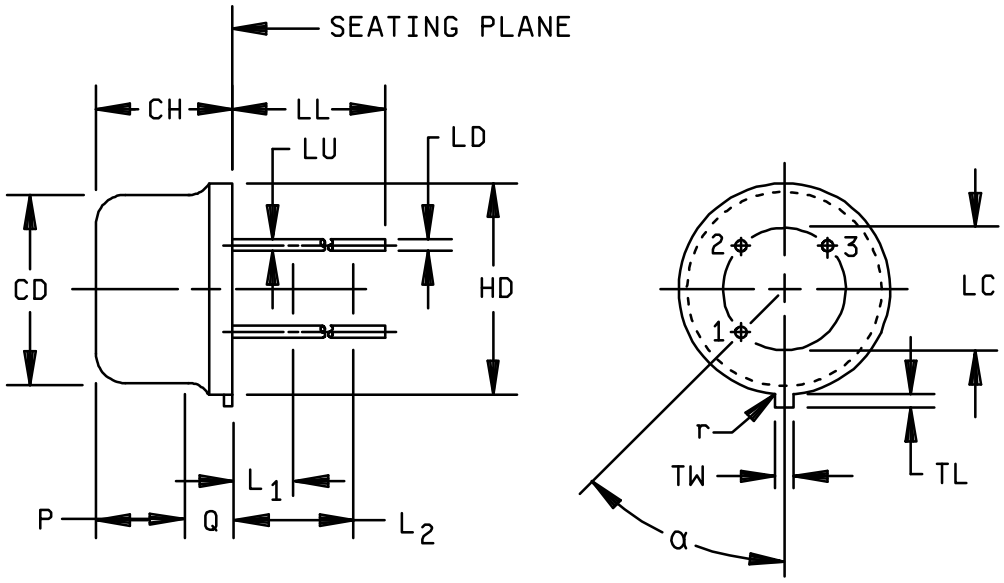


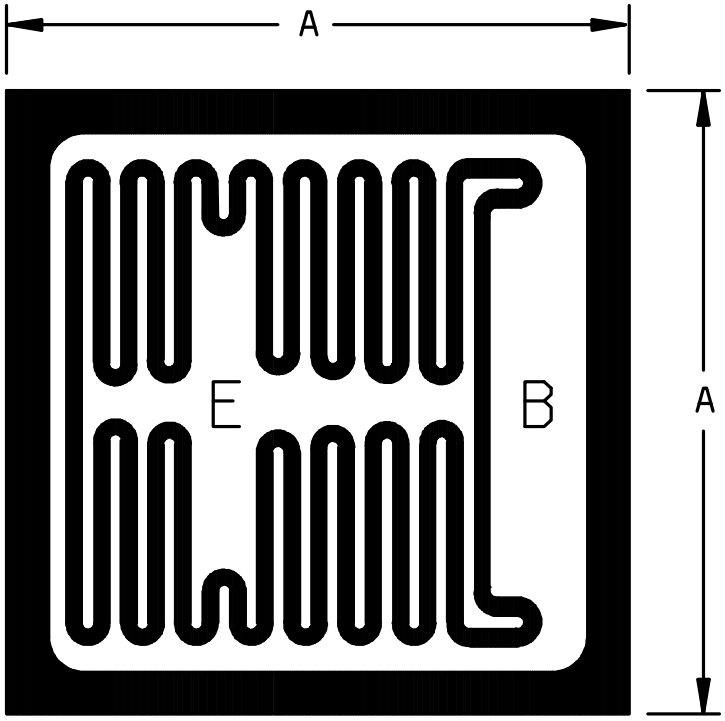
FIGURE 1. Physical dimensions.

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 TP		5.08 TP		6
LD	.016	.021	0.41	0.53	
LL	.500	.750	12.70	19.05	7
LU	See notes 7, 13, 14				
L1		.050		1.27	7
L2	.250		6.35		7
P	.100		2.54		5
TL	.029	.045	0.74	1.14	3, 10
TW	.028	.034	0.71	.86	9, 10
Q		.050		1.27	4
r		.010		.25	11
α	45°TP		45°TP		6

NOTES:

1. Dimensions are in inches. Lead 1 is emitter, lead 2 is base, and lead 3 is collector.
2. Metric equivalents are given for general information only.
3. Symbol TL is measured from HD maximum.
4. Details of outline in this zone are optional.
5. Symbol CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
6. Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of TP relative to tab. Device may be measured by direct methods or by gauge.
7. Symbol 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 L minimum.
8. Lead number three is electrically connected to case.
9. Beyond r maximum, TW shall be held for a minimum length of .021 inch (0.53 mm).
10. Lead number 4 omitted on this variation.
11. Symbol r applied to both inside corners of tab.
12. For transistor types 2N3418S, 2N3419S, 2N3420S, 2N3421S, L IS .500 (12.70 mm) minimum and .750 (19.05 mm) maximum.
13. For transistor types 2N3418, 2N3419, 2N3420, 2N3421, L is .500 (38.10 mm) minimum, and 1.750 (44.45 mm) maximum.
14. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.

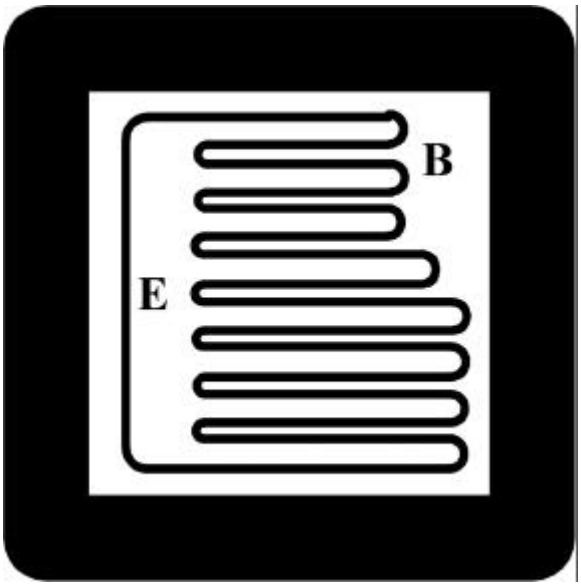
FIGURE 1. Physical dimensions – Continued.



Letter	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.117	.127	2.97	3.23

NOTES:
1. Dimensions are in inches.
2. Metric equivalents (millimeters) are in parenthesis.
3. Metric equivalents are given for general information only.
4. Unless otherwise specified, tolerance is .005 (0.13 mm).
5. The physical characteristics of the die are;
   Thickness: .008 (0.20 mm) to .012 (0.30 mm), tolerance is .005 (0.13 mm).
   Top metal: Aluminum, 40,000 Å minimum, 50,000 Å nominal.
   Back metal: Gold 2,500 Å minimum, 3,000 Å nominal.
   Back side: Collector.
   Bonding pad: B = .015 (0.38 mm) x .0072 (.183).
   E = .015 (0.38 mm) x .0060 (.152).

FIGURE 2. JANHCA and JANKCA die dimensions.



1. Chip size..... 0.075 x 0.075 inches ±2 inches
2. Chip thickness.....0.010 ± 0.0015 inches nominal
3. Top metal.....Aluminum 30,000Å minimum, 33,000Å nominal
4. Back metal.....A. Al/Ti/Ni/Ag12kÅ/3kÅ/7kÅ/7kÅmin.,15kÅ/5kÅ/10kÅ/10kÅ nom.
   B. Gold 2,500Å minimum, 3000Å nominal
5. Backside.....Collector
6. Bonding pad.....B = 0.023 x 0.008 inches, E = 0.049 x 0.008 inches

FIGURE 3. JANHC and JANKC B-version die dimensions.

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

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

3.3 Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified in MIL-PRF-19500, figure 1, (similar to TO-5 and TO-39) and figures 2, and 3 (die) herein.

3.3.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

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

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

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I herein.

3.7 Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.2 and 6.2).

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.

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

4.3 Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with table IV of MIL-PRF19500, 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
9	I_{CEX1} and h_{FE2}	I_{CEX1}
11	I_{CEX1}; h_{FE2}; ΔI_{CEX1} = 100 percent or 50 nA dc, whichever is greater; Δh_{FE2} = +15 , -10 percent change of initial value.	I_{CEX1} and h_{FE2}; ΔI_{CEX1} = 100 percent or 100 nA dc, whichever is greater.
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein; ΔI_{CEX1} = 100 percent or 50 nA dc, whichever is greater; Δh_{FE2} = +15, -10 percent of initial value.	Subgroup 2 of table I herein; ΔI_{CEX1} = 100 percent or 100 nA dc, whichever is greater; Δh_{FE2} = +20, -10 percent of initial value.

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

JANS level: T_A = 25 $\pm$3°C, P_T = 1.0 W

JANTX and JANTXV levels: T_A = 25 $\pm$3°C, P_T = 1.0 W

2N3418, 2N3418S, 2N3420, 2N3420S V_{CB} = 40 V dc

2N3419, 2N3419S, 2N3421, 2N3421S V_{CB} = 60 V dc

4.3.2 Screening JANHC or JANKC. Screening of die shall be in accordance with MIL-PRF-19500, appendix H.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein. Electrical measurements (end-points) shall be in accordance with the applicable inspections of table I, group A, subgroup 2 herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in tables VIa (JANS) and VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and paragraphs 4.4.2.1 and 4.4.2.2 herein. Electrical measurements (end-points) shall be in accordance with the applicable inspections of table I, group A, subgroup 2 herein. Delta measurements shall be in accordance with table II herein.

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

Subgroup	Method	Condition
B3	2037	Test condition A. All internal wires for each device shall be pulled separately.
B4	1037	V_{CE} = 5 V dc, 2000 cycles
B5	1027	V_{CE} = 5 V dc, P_T adjusted to achieve T_J and time required in MIL-PRF-19500.
B7	3053	T_A = 25°C, I_B = 0.5 A dc, I_C = 3.0 A dc, see figure 6.

4.4.2.2 Group B inspection, table VIb (JAN, JANTX and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
B3	1027	T_A = 25 ±5°C; T_J = 150°C minimun.
		V_{CB} = 40 V dc for types 2N3418, 2N3418S, 2N3420, and 2N3420S
		V_{CB} = 60 V dc for types 2N3419, 2N3419S, 2N3421, and 2N3421S
B3	2037	Test condition A, all internal wires for each device shall be pulled separately.
B5	3131	See 4.5.2
B6	1032	T_A = 200°C
B7	3053	T_A = 25°C, I_B = 0.5 A dc, I_C = 3.0 A dc, see figure 6.

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. Electrical measurements (end-points) and delta requirements shall be in accordance with table I, group A, subgroup 2 herein. Delta measurements shall be in accordance with table II herein.

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

Subgroup	Method	Condition
C2	2036	Test condition E
C6	1026	T_A = 25 ±5°C; T_J = 150°C minimum.
		V_{CB} = 40 V dc for types 2N3418, 2N3418S, 2N3420, and 2N3420S
		V_{CB} = 60 V dc for types 2N3419, 2N3419S, 2N3421, and 2N3421S

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Breakdown voltage collector to emitter	3011	Bias condition D; I_C = 50 mA dc, I_B = 0, pulsed (see 4.5.1)	$V_{(BR)CEO}$			
2N3418, 2N3418S 2N3420, 2N3420S				60		V dc
2N3419, 2N3419S 2N3421, 2N3421S				80		V dc
Collector to emitter cutoff current	3041	Bias condition A; V_{BE} = -0.5 V dc	I_{CEX1}			
2N3418, 2N3418S 2N3420, 2N3420S		V_{CE} = 80 V dc			0.3	µA dc
2N3419, 2N3419S 2N3421, 2N3421S		V_{CE} = 120 V dc			0.3	µA dc
Collector to emitter cutoff current	3041	Bias condition D; I_B = 0	I_{CEO}			
2N3418, 2N3418S 2N3420, 2N3420S		V_{CE} = 45 V dc			5.0	µA dc
2N3419, 2N3419S 2N3421, 2N3421S		V_{CE} = 60 V dc			5.0	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 6 V dc, I_C = 0	I_{EBO1}		0.5	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 8 V dc, I_C = 0	I_{EBO2}		10	µA dc
Forward current transfer ratio	3076	V_{CE} = 2 V dc; I_C = 100 mA dc, pulsed (see 4.5.1)	h_{FE1}			
2N3418, 2N3418S 2N3419, 2N3419S				20		
2N3420, 2N3420S 2N3421, 2N3421S				40		

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} = 2 V dc; I_C = 1.0 A dc, pulsed (see 4.5.1)	h_{FE2}			
2N3418, 2N3418S 2N3419, 2N3419S				20	60	
2N3420, 2N3420S 2N3421, 2N3421S				40	120	
Forward current transfer ratio	3076	V_{CE} = 2 V dc; I_C = 2 A dc, pulsed (see 4.5.1)	h_{FE3}			
2N3418, 2N3418S 2N3419, 2N3419S				15		
2N3420, 2N3420S 2N3421, 2N3421S				30		
Forward current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 5 A dc, pulsed (see 4.5.1)	h_{FE4}			
2N3418, 2N3418S 2N3419, 2N3419S				10		
2N3420, 2N3420S 2N3421, 2N3421S				15		
Base-emitter voltage (saturated)	3066	Test condition A; I_C = 1.0 A dc, I_B = 0.1 A dc, pulsed (see 4.5.1)	$V_{BE(sat)1}$ 2/	0.6	1.2	V dc
Base-emitter voltage (saturated)	3066	Test condition A; I_C = 2.0 A dc, I_B = 0.2 A dc, pulsed (see 4.5.1)	$V_{BE(sat)2}$ 2/	0.7	1.4	V dc
Saturation voltage and resistance (collector-emitter)	3071	I_C = 1.0 A dc, I_B = 0.1 A dc, pulsed (see 4.5.1)	$V_{CE(sat)1}$ 2/		0.25	V dc
Saturation voltage and resistance (collector-emitter)	3071	I_C = 2.0 A dc, I_B = 0.2 A dc, pulsed (see 4.5.1)	$V_{CE(sat)2}$ 2/		0.5	V dc

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 3						
High-temperature operation:		T_A = +150°C				
Collector to emitter cutoff current	3041	Bias condition A; V_{BE} = -0.5 V dc	I_{CEX2}			
2N3418, 2N3418S 2N3420, 2N3420S		V_{CE} = 80 V dc			50	µA dc
2N3419, 2N3419S 2N3421, 2N3421S		V_{CE} = 120 V dc			50	µA dc
Low-temperature operation:		T_A = -55°C				
Forward current transfer ratio	3076	V_{CE} = 2 V dc, I_C = 1 A dc pulsed (see 4.5.1)	h_{FE5}	10		
Subgroup 4						
Small-signal short-circuit forward-current transfer ratio magnitude of common emitter)	3306	V_{CE} = 10 V dc; I_C = 0.1 mA dc; f = 20 MHz	$\|h_{fe}\|$	1.3	8	
Open-circuit output capacitance	3236	V_{CB} = 10 V dc, I_E = 0 , 100 kHz ≤ f ≤ 1 MHz	C_{obo}		150	pF
Switching time		I_C = 1.0 A dc, $I_{B(1)}$ = 100 mA dc, $I_{B(2)}$ = -100 mA dc, $V_{BE(off)}$ = -3.7 V dc, R_L = 20 Ω, see figure 3	t_r t_d t_s t_f t_{off}		0.22 0.08 1.10 0.20 1.20	µs µs µs µs µs
Subgroup 5						
Safe operating area (continuous dc)	3051	T_C = 100°C, t ≥ 1 s, 1 cycle, see figure 4				
Test 1		I_C = 3 A dc, V_{CE} = 5 V dc				
Test 2		I_C = 0.4 A dc, V_{CE} = 37 V dc				
Test 3						
2N3418, 2N3418S 2N3420, 2N3420S		I_C = 0.185 A dc, V_{CE} = 60 V dc				
2N3419, 2N3419S 2N3421, 2N3421S		I_C = 0.12 A dc, V_{CE} = 80 V 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	
Subgroup 5 - Continued						
Safe operating area (clamped switching)	3053	T_A = 25°C, I_B = 0.5 A dc, I_C = 3.0 A dc, see figure 5				
Electrical measurements		See group A, subgroup 2 herein				
Subgroup 6 and 7						
Not applicable						

1/ See MIL-PRF-19500 for sampling plan..

2/ Measured at a point on the leads no further then 0.125 inch (3.18 mm) from the case.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Thermal resistance. Thermal resistance measurements shall be conducted in accordance with test method 3131 of MIL-STD-750. The following details shall apply:

a. Collector current magnitude during power applications shall be 1.0 A dc.

b. Collector to emitter voltage magnitude shall be 10 V dc.

c. The measuring current magnitude shall be 1 mA dc.

d. Reference temperature measuring point shall be the case.

e. Reference point temperature shall be 25°C ≤ T_R ≤ 75°C and recorded before the test is started.

f. Mounting arrangement shall be out to heat sink.

g. maximum limits for $R_{\theta JC}$ shall be 6.67°C/W.

TABLE II. Groups A, B, and C delta measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Forward-current transfer ratio	3076	V_{CE} = 2 V dc I_C = 1.0 A dc pulsed (see 4.5.1)	Δh_{FE2} 1/		+20 percent, -10 percent change from initial group A reading	
2.	Collector to emitter cutoff current	3041	Bias condition A; V_{BE} = -0.5 V dc	ΔI_{CEX1} 1/			
	2N3418, 2N3418S 2N3420, 2N3420S		V_{CE} = 80 V dc			100 percent of initial value or 100 nA dc, whichever is greater	
	2N3419, 2N3419S 2N3421, 2N3421S		V_{CE} = 120 V dc			100 percent of initial value or 100 nA dc, whichever is greater	
3.	Saturation voltage and resistance (collector-emitter)	3071	I_C = 1.0 A dc, I_B = 0.1 A dc, pulsed (see 4.5.1)	$\Delta V_{CE(sat)1}$ 1/		±50 mV dc change from previously measured value	

1/ The delta measurements for table VIa (JANS) of MIL-PRF-19500 are as follows:

a. Subgroup 4, see table II herein, steps 1 and 3.

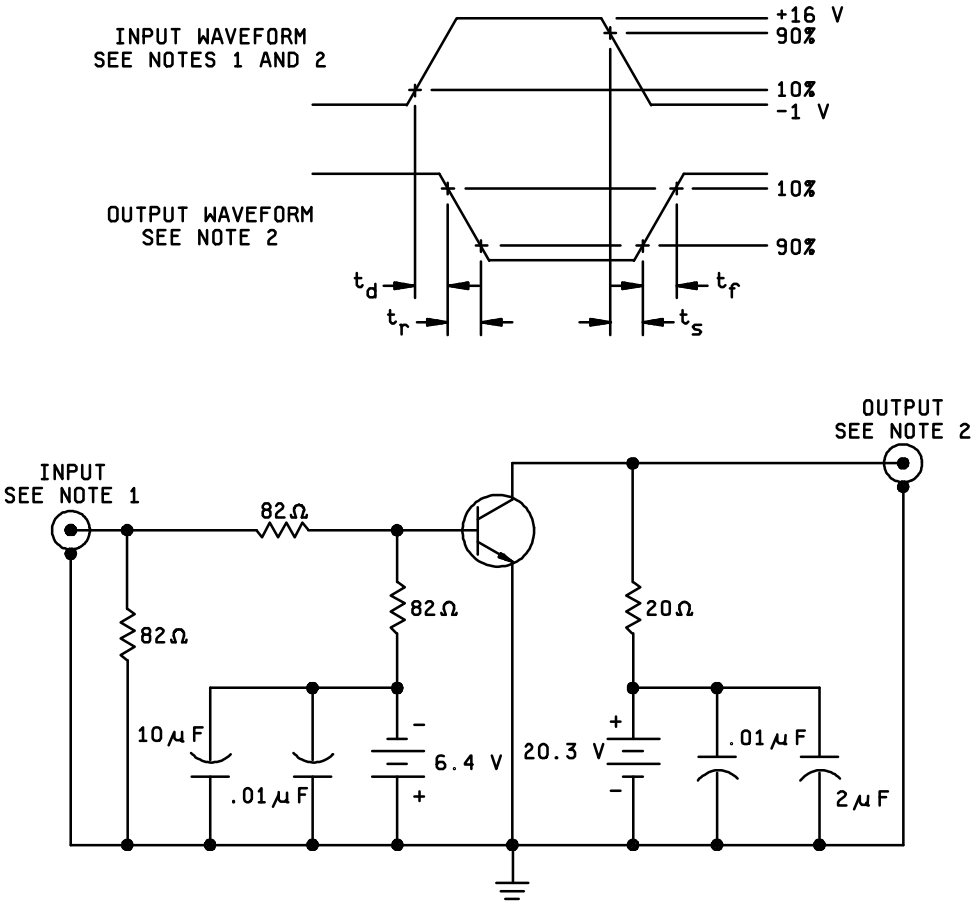
b. Subgroup 5, see table II herein, steps 1, 2, and 3.

2/ The delta measurements for table VIb (JAN, JANTX, JANTXV) of MIL-PRF-19500 are as follows:

a. Subgroups 3 and 6, see table II herein, step 1.

3/ The delta measurements for table VII (JANS) of MIL-PRF-19500 are as follows:

a. Subgroups 2, 3, and 6, see table II herein, steps 1, 2, and 3.



NOTES:

1. The input waveform is supplied by a pulse generator with the following characteristics: $t_r \leq 15$ ns, $t_f \leq 15$ ns, $Z_{OUT} = 50\ \Omega$, PW = 2 μs, duty cycle ≤ 2 percent.
2. Output waveforms are monitored by an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10\ M\Omega$, $C_{in} \leq 11.5$ pF.
3. Resistors shall be noninductive types.
4. The DC power supplies may require additional by-passing in order to minimize ringing.

FIGURE 4. Pulse response test circuit.

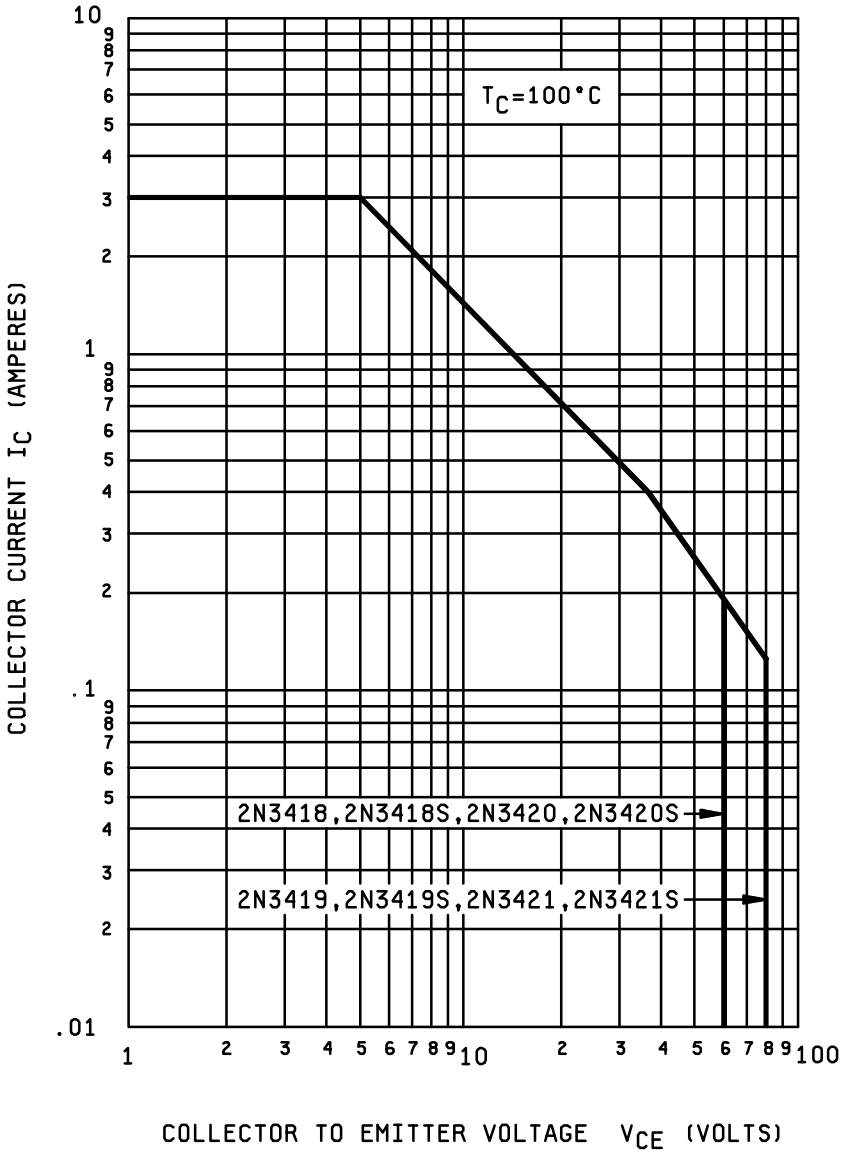
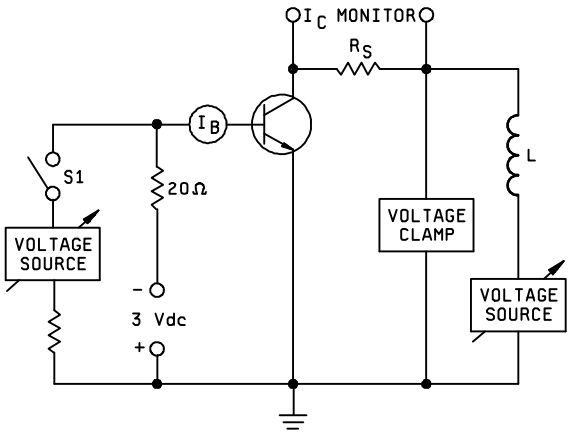


FIGURE 5. Maximum safe operating region.



NOTES:

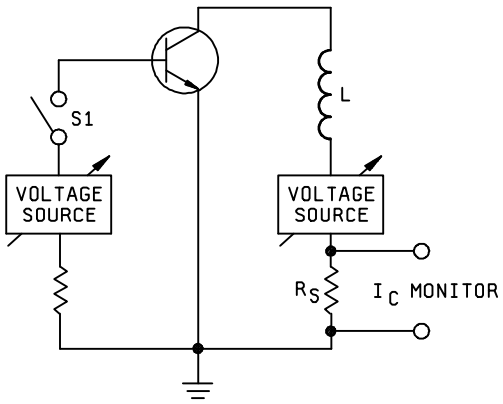
Voltage clamp: 2N3418, 2N2418S, 2N3420, 2N3420S = 85 V dc
2N3419, 2N3419S, 2N3421, 2N3421S = 125 V dc

$R_S \leq 1.0\ \Omega$ (noninductive), L = 40 mH

Procedure:

1. With switch S_1 closed, set the specified test conditions.
2. Open S_1.
3. Perform specified end-point tests.

FIGURE 6. Clamped inductive sweep test circuit diagram.



NOTES:

$R_S \leq 1.0\ \Omega$ (noninductive), L = 10 mH

Procedure:

1. With switch S_1 closed, set the specified test conditions.
2. Open S_1.
3. Perform specified end-point tests.

FIGURE 7. Unclamped inductive sweep test circuit diagram.

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 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-STD-129.

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. Acquisition documents should specify the following:

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

b. Lead finish (see 3.3.1).

c. Type designation and product assurance level.

d. Packaging requirements (see 5.1).

6.3. 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.

6.4. Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example JANHCA2N5152) will be identified on the QML.

JANHC and JANKC ordering information

PIN	Manufacturer	
	33178	43611
2N3418	JANHCA2N3418	JANHCB2N3418
2N3419	JANHCA2N3419	JANHCB2N3419
2N3420	JANKCA2N3420	JANKCB2N3420
2N3421	JANKCA2N3421	JANKCB2N3421
2N3418S	JANKCA2N3418S	JANKCB2N3418S
2N3419S	JANKCA2N3419S	JANKCB2N3419S
2N3420S	JANKCA2N3420S	JANKCB2N3420S
2N3421S	JANKCA2N3421S	JANKCB2N3421S

6.5. 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 Manufacturer's 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, DSCC-VQE, Columbus, OH 43216.

CONCLUDING MATERIAL

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

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

Preparing activity:
DLA - CC

(Project 5961-2125)

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, and send to preparing activity.

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-19500/393C	2. DOCUMENT DATE *(YYYYMMDD)*

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, POWER, TYPE 2N3418, 2N3418S, 2N3419, 2N3419S, 2N3420, 2N3420S, 2N3421, 2N3421S, 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)* (1) Commercial (2) DSN *(If applicable)*	7. DATE SUBMITTED *(YYYYMMDD)*

8. PREPARING ACTIVITY

a. NAME Alan Barone	b. TELEPHONE *(Include Area Code* (1) Commercial 614-692-0510 (2) DSN 850-0510
c. ADDRESS *(Include Zip Code)* DSCC-VAC Post Office Box 3990 Columbus, Ohio 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703)767-6888 DSN 427-6888