

The documentation and process conversion measures necessary to comply with this revision shall be completed by 28 April 1994

INCH-POUND

MIL-S-19500/535A(USAF)
28 January 1994
SUPERSEDING
MIL-S-19500/535(USAF)
4 February 1980

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER
TYPES 2N5003, 2N5005, 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 detail requirements for PNP, silicon, power transistors for use in high-speed power-switching applications. Four levels of product assurance are provided for each device type as specified in MIL-S-19500. Two levels of product assurance are provided for unencapsulated die.

1.2 Physical dimensions. See figure 1 (T6-C, similar to T0-59) and figure 2 (JANHC and JANKC).

1.3 Maximum ratings.

PT 1/ T _A = +25°C	PT 2/ T _C = +25°C	V _{CBO}	V _{CEO}	V _{EBO}	I _C	I _C 3/	Reverse pulse 4/ energy	Safe operating area	T _{stg} and T _J
<u>W</u>	<u>W</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>A dc</u>	<u>mJ</u>	See	<u>°C</u>
2	58	100	80	5.5	5	10	15	figure 3	-65 to +200

1/ Derate linearly 11.4 mW/°C for T_A > +25°C

2/ Derate linearly 331 mW/°C for T_C > +25°C

3/ This value applies for P_w ≤ 8.3 ms, duty cycle ≤ 1%.

4/ This rating is based on the capability of the transistors to operate safely in the unclamped inductive load energy test circuit of figure 4.

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

Limits	h _{FE} 2 1/ V _{CE} = 5 V I _C = 2.5 A		h _{fe} V _{CE} = 5 V I _C = 500 mA dc f = 10 MHz		V _{BE(sat)} 2 1/ I _C = 5 A dc I _B = 500 mA dc		V _{CE(sat)} 2 1/ I _C = 5 A dc I _B = 500 mA dc		C _{obo} V _{CB} = 10V dc I _E = 0 f = 1 MHz		R _{θJA}	R _{θJC}
	2N5003	2N5005	2N5003	2N5005	<u>V dc</u>		<u>V dc</u>		<u>pf</u>	<u>°C/W</u>	<u>°C/W</u>	
Min	30	70	6	7	2.2		1.5		250	88	3	
Max	90	200										

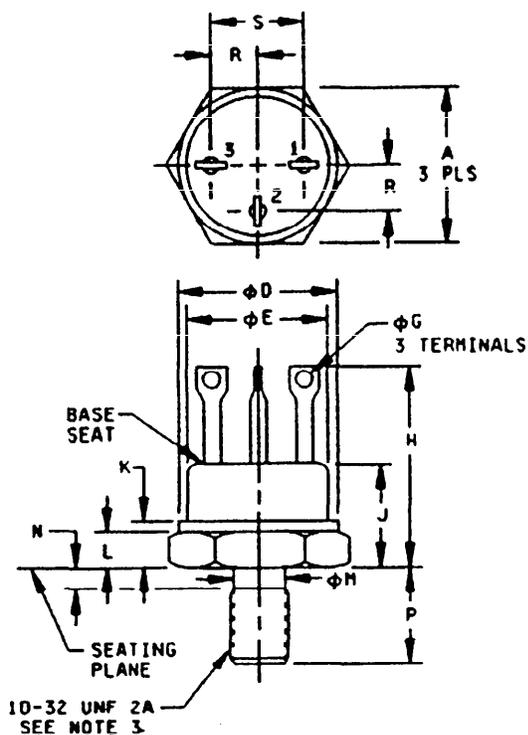
1/ Pulsed (see 4.5.1)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Electronics Supply Center, ATTN: DESC-ECT, 1507 Wilmington Pike, Dayton, OH 45444-5270, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

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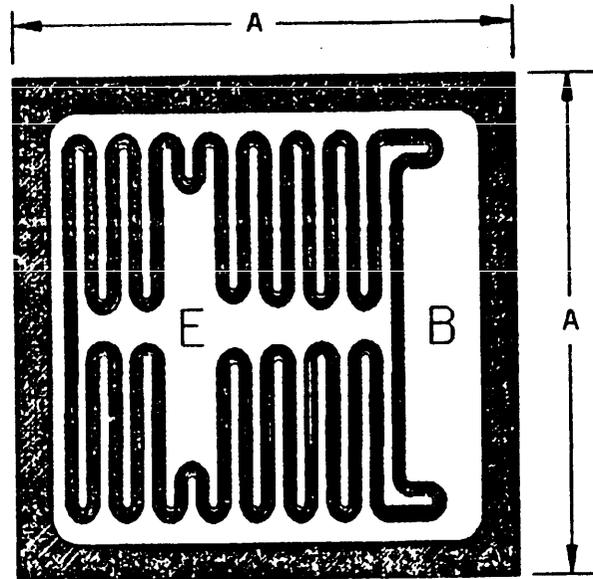


Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.424	.437	10.77	11.10	
ϕD	.370	.437	9.40	11.10	
ϕE	.330	.360	8.38	9.14	
ϕG	.040	.065	1.02	1.65	
H	.575	.763	14.61	19.40	5
J	.320	.468	8.13	11.80	
K		.250		6.35	
L	.090	.150	2.67	3.81	
ϕM	.155	.189	3.94	4.80	
N		.078		1.98	7
P	.400	.455	10.16	11.56	
R	.090	.110	2.29	2.79	4,8
S	.185	.215	4.70	5.46	4,8

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. See FED-STD-H28, Screw-Thread Standards for Federal Services.
4. The orientation of the terminals in relation to the hex flats is not controlled.
5. All three terminals.
6. The case temperature may be measured anywhere on the seating plane within .125 (3.18 mm) of the stud.
7. Terminal spacing measured at the base seat only.
8. This dimension applies to the location of the center line of the terminals.
9. Terminal - 1, emitter; terminal - 2, base; terminal - 3, collector. Collector lead is isolated from the case.

FIGURE 1. Physical dimensions of transistor types (JAN, JANTX, and JANTXV) 2N5003 and 2N5005 (TO-59).



Dimensions				
Ltr	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 $\pm .005$ (0.13 mm).
5. The physical characteristics of the die are;
 - Thickness: .008 (0.20 mm) to .012 (0.30 mm), tolerance is $\pm .005$ (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).

Inches	mm
.005	0.13
.006	0.15
.0072	0.183
.008	0.20
.012	0.30
.015	0.38
.117	2.97
.127	3.23

FIGURE 2. Physical dimensions JANHCA and JANKCA die dimensions.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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

MILITARY

MIL-S-19500 - Semiconductor Devices, General Specification for.

STANDARD

FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services.

MILITARY

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

(Unless otherwise indicated, copies of the federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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

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

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500 and figure 1 (T6-C) (T0-59) and figure 2 (JANHC and JANKC) herein.

3.3.1 Lead finish. Lead finish shall be solderable in accordance with MIL-STD-750, MIL-S-19500, and as specified herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.3.2 Current density. Current density of internal conductors shall be as specified in 3.6.5 of MIL-S-19500.

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

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500.

4.2.1 JANHC and JANKC devices. Qualification for shall be in accordance with appendix H of MIL-S-19500.

4.3 Screening (JANS, JANTX and JANIXY levels only). Screening shall be in accordance with MIL-S-19500 (table II), 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 II of MIL-S-19500)	Measurement	
	JANS Level	JANTX and JANIXY Levels
1/	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	ICES1 and hFE2	Not applicable
11	$\Delta I_{CES1} = 100\%$ or 100 nA, whichever is greater; $\Delta hFE2 = \pm 20\%$	ICES1 and hFE2
12	See 4.3.1	See 4.3.1
13	Subgroup 2 and 3 of table I herein: $\Delta I_{CES1} = +100\%$ of initial value or 100 nA whichever is greater $\Delta hFE2 = \pm 20\%$	Subgroup 2 of table I herein: $\Delta I_{CES1} = +100\%$ of initial value or 100 nA whichever is greater $\Delta hFE2 = \pm 20\%$

1/ May be performed anytime before screen 9.

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

$V_{CE} = 40\text{ V} \pm 1\text{ V}$ $P_T = 2.0\text{ W (min)}$

NOTE: No heat sink or forced air cooling on the device 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. The maximum limit (not to exceed the group A, Subgroup 2 limit) for $Z_{\theta JX}$ in screening (table II of MIL-S-19500) shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X, R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for Engineering evaluation and disposition.

4.3.2.1 Thermal impedance ($Z_{\theta JX}$ measurements) for initial qualification or requalification. The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3131 (read and record date $Z_{\theta JX}$). $Z_{\theta JX}$ shall be supplied on one lot (500 devices minimum and a thermal response curve shall be submitted). Twenty-two of these samples shall be serialized and provided to the qualifying activity for correlation prior to shipment of parts. Measurements conditions shall be in accordance with 4.4.1.

4.3.3 Screening (JANHC or JANKC). Screening of die shall be in accordance with MIL-S-19500, appendix H. As a minimum, die shall be 100-percent probed to ensure compliance with group A, subgroup 2.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-S-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-S-19500 and table I herein. End-point electrical measurements shall be in accordance with the applicable steps of table II herein. The following test conditions shall be used for $Z_{\theta JX}$, end-point measurements: $Z_{\theta JX} = 3.1^{\circ}\text{C/W}$.

- a. I_H - - - - - 10 mA.
- b. V_{CE} measurement voltage - - - - - 20 V (same as V_H).
- c. I_H collector heating current - - - - - 1 A (minimum).
- d. V_H collector-emitter heating voltage - - - - - 20 V (minimum).
- e. t_H heating time - - - - - 100 ms.
- f. t_{MD} measurement delay time - - - - - 50 μs to 80 μs .
- g. t_{SW} sample window time - - - - - 10 μs (maximum).

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with conditions specified for the subgroup testing in table IVa (JANS) and table IVb (JAN, JANTX, and JANTXV) of MIL-S-19500, and as follows. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.2.1 Group B inspection, table IVa (JANS) of MIL-S-19500.

Subgroup	Method	Condition
B4	1037	$V_{CB} = 10$ V dc minimum, $P_T = 2.5$ W minimum, $T_A = +25^{\circ}\text{C} \pm 3^{\circ}\text{C}$; $t_{on} = t_{off} = 3$ minutes minimum for 2,000 cycles. No heat sink or forced-air cooling on devices shall be permitted.
B5	1027	$V_{CB} = 20$ V dc, $T_J = +275^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 96 hours; Adjust the chosen T_A and P_T to give an average lot $T_J = +275^{\circ}\text{C}$. Marking legibility requirements shall not apply.
B6	3131	See 4.5.2

4.4.2.2 Group B inspection, table IVb (JANTX and JANTXV) of MIL-S-19500.

Subgroup	Method	Conditions
B3	1037	$V_{CB} = 10$ V dc minimum, $P_T = 2.5$ W minimum, $T_A = +25^{\circ}\text{C} \pm 3^{\circ}\text{C}$; $t_{on} = t_{off} = 3$ minutes minimum for 2,000 cycles. No heat sink or forced-air cooling on devices shall be permitted.
B5	3131	See 4.5.2

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IV of MIL-S-19500 and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

Subgroup	Method	Conditions
C2	2036	Test condition A, weight = 7 lbs, ± 5 oz, application time = 15 seconds; Test condition D1, torque = 6 in - oz, application time = 15 seconds; Test condition D2, torque = 15 in - lbs, application time = 15 seconds.
C6	1037	$V_{CB} = 10$ V dc minimum, $P_T = 2.5$ W minimum, $T_A = +25^{\circ}\text{C} \pm 3^{\circ}\text{C}$; $t_{on} = t_{off} = 3$ minutes minimum for 6,000 cycles. No heat sink or forced-air cooling on devices shall be permitted.

4.5 Methods of examination and test. Methods of examination and test shall be as specified in the appropriate tables and as follows:

4.5.1 Pulse measurements. Conditions for pulse measurements 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 method 3131 of MIL-STD-750. The following details shall apply:

- a. Collector current magnitude during power application shall be 2.0 A dc.
- b. Collector to emitter voltage magnitude shall be 10 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 of $R_{\theta JC}$ shall be 3.0°C/W .

4.5.3 Inspection conditions. Unless otherwise specified herein all inspections shall be conducted at a case temperature (T_C) of $+25^{\circ}\text{C}$.

TABLE I. Group A inspection.

Inspection 1/ Method	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical inspection	2071					
<u>Subgroup 2</u>						
Thermal impedance	3131	See 4.4.1			3.1	°C/W
Breakdown voltage, collector to emitter	3011	Bias condition D, I _C = 100 mA dc I _B = 0 Pulsed (see 4.5.1)	V(BR)CEO	80		V dc
Collector to emitter cutoff current	3041	Bias condition C, V _{CE} = 60 V dc V _{BE} = 0	ICES1		1.0	μA dc
Collector to emitter cutoff current	3041	Bias condition C, V _{CE} = 100 V dc V _{BE} = 0	ICES2		1.0	mA dc
Collector to emitter cutoff current	3041	Bias condition D, V _{CE} = 40 V dc I _B = 0	ICE0		50	μA dc
Emitter to base cutoff current	3061	Bias condition D, V _{EB} = 4 V dc I _C = 0	IEB01		1.0	μA dc
Emitter to base cutoff current	3061	Bias condition D, V _{EB} = 5.5 V dc I _C = 0	IEB02		1.0	mA dc
Forward current transfer ratio	3076	V _{CE} = 5 V dc I _C = 50 mA dc	hFE1			
2N5003				20		
2N5005				50		
Forward - current transfer ratio	3076	V _{CE} = 5 V dc I _C = 2.5 A dc Pulsed (see 4.5.1)	hFE2			
2N5003				30	90	
2N5005				70	200	
Forward - current transfer ratio	3076	V _{CE} = 5 V dc I _C = 5 A dc Pulsed (see 4.5.1)	hFE3			
2N5003				20		
2N5005				40		

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 - Continued.</u>						
Base-emitter voltage (nonsaturated)	3066	Test condition B, VCE = 5 V dc IC = 2.5 A dc Pulsed (see 4.5.1)	VBE		1.45	V dc
Base-emitter saturation voltage	3066	Test condition A, IC = 2.5 A dc IB = 250 mA dc Pulsed (see 4.5.1)	VBE(sat)1		1.45	V dc
Base-emitter saturation voltage	3066	Test condition A, IC = 5 A dc IB = 500 mA dc Pulsed (see 4.5.1)	VBE(sat)2		2.2	V dc
Collector-emitter saturation voltage	3071	IC = 2.5 A dc IB = 250 mA dc Pulsed (see 4.5.1)	VCE(sat)1		0.75	V dc
Collector-emitter saturation voltage	3071	IC = 5 A dc VCE = 40 V dc Pulsed (see 4.5.1)	VCE(sat)2		1.5	V dc
<u>Subgroup 3</u>						
High temperature operation:		TC = +150°C				
Collector to emitter cutoff current	3041	Bias condition A VCE = 60 V dc VBE = +2 V dc	ICEX		500	μA dc
Low temperature operation		TC = -55°C				
Forward - current transfer ratio	3076	VCE = 5 V dc IC = 2.5 A dc Pulsed (see 4.5.1)	hFE4			
2N5003 2N5005					15 25	
<u>Subgroup 4</u>						
Common-emitter, small- signal, short-circuit, forward-current transfer ratio	3206	VCE = 5 V dc IC = 100 mA dc f = 1 kHz	hfe			
2N5003 2N5005					20 50	

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>						
Magnitude of common-emitter, small-signal short-circuit, forward-current, transfer ratio 2N5003 2N5005	3206	$V_{CE} = 5 \text{ V dc}$ $I_C = 500 \text{ mA dc}$ $f = 10 \text{ MHz}$	h_{fe}	6 7		
Open-circuit output capacitance	3236	$V_{CB} = 10 \text{ V dc}$, $I_E = 0$, $f = 1 \text{ MHz}$	C_{obo}		250	pf
Switching time		$I_C = 5 \text{ A dc}$ $I_{B1} = 500 \text{ mA dc}$	t_{on}		0.5	μs
		$I_{B2} = -500 \text{ mA dc}$	t_s		1.4	μs
		$V_{BE}(\text{off}) = 3.7 \text{ V}$	t_f		0.5	μs
		$R_L = 6\Omega$ (See figure 5)	t_{off}		1.5	μs
<u>Subgroup 5</u>						
Safe operating area (dc)	3055	Pre-pulse condition for each test: $V_{CE} = 0$ $I_C = 0$ $T_C = +25^\circ\text{C}$ Pulse condition for each test $t_p = 1 \text{ sec.}$ 1 cycle $T_C = +25^\circ\text{C}$ (See figure 3)				
Test # 1		$V_{CE} = 12 \text{ V dc}$ $I_C = 5 \text{ A dc}$				
Test # 2		$V_{CE} = 32 \text{ V dc}$ $I_C = 1.7 \text{ V dc}$				
Test # 3		$V_{CE} = 80 \text{ V dc}$ $I_C = 100 \text{ mA dc}$				

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 5 - Continued.</u>						
Safe operating area (unclamped inductive)		$T_C = +25^\circ\text{C}$ $R_{BB1} = 10\Omega$ $R_{BB2} = 100\Omega$ $L = 0.3 \text{ mH}$ $R_L = 0.1\Omega$ $V_{CC} = 10 \text{ V dc}$ $V_{BB1} = 10 \text{ V dc}$ $V_{BB2} = 4 \text{ V dc}$ $I_{CM} = 10 \text{ A dc}$ (See figure 4)				
End-point electrical measurements		See table II Steps 1, 2, and 3				
<u>Subgroups 6 and 7</u>						
Not applicable						

1/ For sampling plan, see MIL-S-19500

TABLE II. Groups A, B, and C electrical measurements. 3/, 4/, 5/

Steps	Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Collector to emitter cutoff current	3041	VCE = 60 V dc Cond. C, VBE = 0	ICES1		1.0	μ A dc
2.	Forward - current transfer ratio 2N5003 2N5005	3076	VCE = 5 V dc IC = 2.5 A dc Pulsed (see 4.5.1)	hFE2		90 200	
3.	Breakdown voltage collector to emitter	3011	Bias condition A, IC = 100 mA dc IB = 0 Pulsed (see 4.5.1)	V(BR)CEO	80		V dc
4.	Collector to emitter cutoff current	3041	VCE = 60 V dc	ICES1 <u>2/</u>		100% of initial value or 100 nA whichever is greater	
5.	Forward - current transfer ratio	3076	IC = 2.5 V dc VCE = 5 V dc Pulsed (see 4.5.1)	Δ hFE2 <u>2/</u>	\pm 20% change from initial reading		
6.	Base to emitter saturation voltage	3066	Test condition A, IC = 2.5 A dc IB = 250 mA dc Pulsed (see 4.5.1)	VBE(sat)		1.45	V dc

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

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

3/ The electrical measurements for table IVa (JANS) of MIL-S-19500 are as follows:

- a. Subgroup 3, see table II herein, steps 1, 2, and 6.
- b. Subgroup 4, see table II herein, steps 2, 3, 4, 5, and 6.
- c. Subgroup 4, see table II herein, steps 2, 3, 4, 5, and 6.

4/ The electrical measurements for table IVb (JANTX and JANTXV) of MIL-S-19500 are as follows:

- a. Subgroup 2, see table II herein, steps 1, 2, and 3.
- b. Subgroup 3, see table II herein, steps 1, 2, 4, and 5.
- c. Subgroup 6, see table II herein, steps 1, 2, 4, and 5.

5/ The electrical measurements for table V of MIL-S-19500 are as follows:

- a. Subgroup 2, see table II herein, steps 1, 2, and 3.
- b. Subgroup 3, see table II herein, steps 1, 2, and 3.
- c. Subgroup 6, see table II herein, steps 1, 2, 4, and 5.

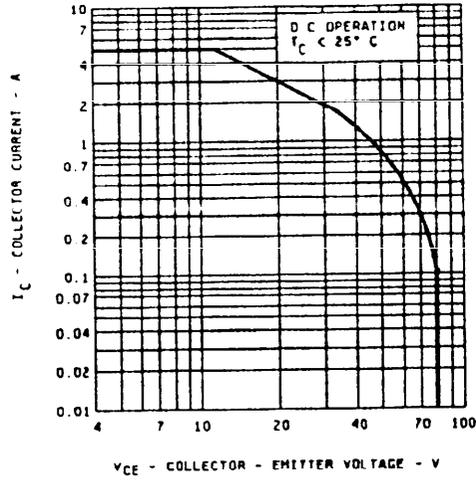


FIGURE 3. Maximum safe operating area.

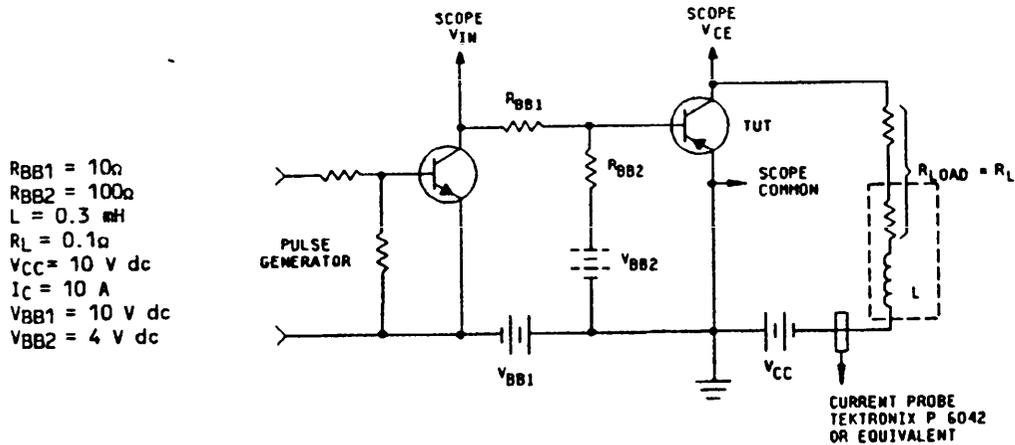
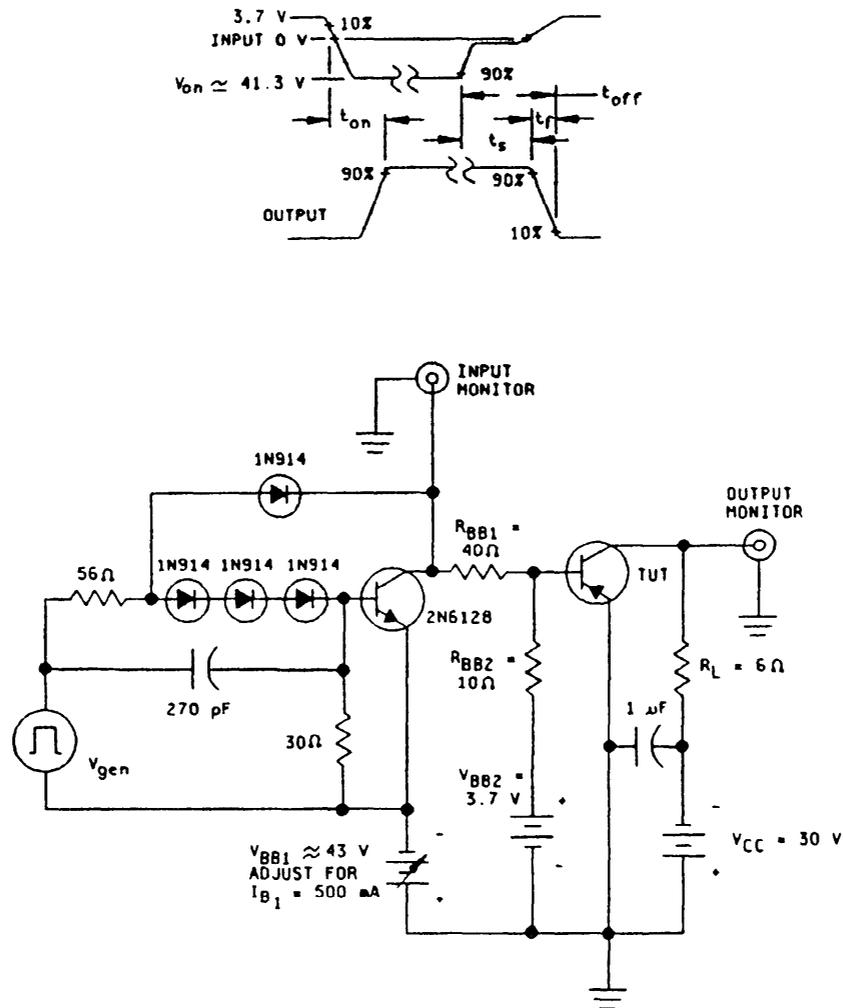


FIGURE 4. Unclamped inductive load energy test circuit.



NOTES:

1. V_{gen} is -30 pulse (from 0 V) into a 50 ohm termination.
2. The V_{gen} waveform is supplied by a generator with the following characteristics:
 $t_r \leq 15$ ns, $t_f = 15$ ns, $Z_{OUT} = 50$ ohm, duty cycle $\leq 2\%$.
3. Waveforms are monitored on an oscilloscope with the following characteristics:
 $t_r \leq 1$ ns, $R_{IN} \geq 10$ Mo, $C_{IN} \leq 11.5$ pF.
3. Resistors shall be noninductive types.
4. The dc power supplies may require additional bypassing in order to minimize ringing.
5. An equivalent drive circuit may be used.

FIGURE 5. Switching time test circuit.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

6. NOTES

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

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

6.2 Complimentary use. The devices specified herein are designed for complimentary use with the 2N5002 and 2N5004.

6.3 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
- c. Lead finish (see 3.3.1)
- d. Product assurance level and type designator.

6.4 Interchangeability information. The 2N5003 and 2N5005 (MIL-S-19500/535) are inactive for new design. For new design use 2N7372 (MIL-S-19500/612). MIL-S-19500/612 is a TO-254 package version of MIL-S-19500/535, which is a TO-210 (TO-59) package version. The military 2N7372 contains the same die as the military 2N5003 and 2N5005.

6.5 Suppliers of JANHC die. The qualified JANHC die suppliers with the applicable letter version (example JANHCA1N4370A) will be identified on the QPL.

JANHC ordering information	
PIN	Manufacture CAGE
	33178
2N5003	JANHCA2N5003
2N5005	JANHCA2N5005
2N5003	JANKCA2N5003
2N5005	JANKCA2N5005

CONCLUDING MATERIAL

Custodians:

Air Force - 17
NASA - NA

Review activities:

Air Force - 19, 85, 99
DLA - ES

Preparing activity:

Air Force - 17

Agent:

DLA - ES

(Project 5961-F111)

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.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-S-19500/535A(USAF)	2. DOCUMENT DATE (YYMMDD) 94/01/28
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3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER TYPES 2N5003, 2N5005, 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) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

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c. ADDRESS (Include Zip Code) Defense Electronics Supply Center ATTN: DESC-ECT Dayton, OH 45444-5270	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 AUTOVON 289-2340