INCH-POUND

MIL-S-19500/394B
24 March 1993
SUPERSEDING
MIL-S-19500/394A
10 September 1982

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

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, POWER SWITCHING
TYPES 2N4150, 2N5237, 2N5238, 2N4150S, 2N5237S, 2N5238S
JANTX, JANTXV, AND JANS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for NPN, silicon, power transistors for use in high-speed power switching applications. Three levels of product assurance are provided for each device type as specified in MIL-S-19500. For JAN quality level see 6.3.1.

1.2 Physical dimensions. See figure 1.

1.3 Maximum ratings.

Types	P_T T_A = +25°C 1/	P_T T_C = +100°C 2/	V_{CBO}	V_{CEO}	V_{EBO}	I_C	T_{STG} and T_{TJ}	$R_{\theta JC}$	$R_{\theta JA}$
	W	W	V dc	V dc	V dc	A dc	°C	°C/mW	°C/mW
2N4150, S	1.0	5	100	70	7	10	-65° to +200°C	.020	.175
2N5237, S	1.0	5	150	120	7	10	-65° to +200°C	.020	.175
2N5238, S	1.0	5	200	170	7	10	-65° to +200°C	.020	.175

1/ Derate linearly 5.7 mW/°C for T_A > +25°C.
2/ Derate linearly 50 mW/°C for T_C > +25°C.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: NASA/Parts Project Office (NPPO), NASA Goddard Space Flight Center, Code 310.A, Greenbelt, MD 20771 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.

1.4 Primary electrical characteristics.

Limits	h_{FE2} 1/ I_C = 5 A dc V_{CE} = 5 V dc	h_{FE3} 1/ I_C = 10 A dc V_{CE} = 5 V dc	C_{obo} I_E = 0 V_{CB} = 10 V dc 100 kHz ≤ f ≤ 1 MHz	h_{fe} I_C = 0.2 A dc V_{CE} = 10 V dc f = 10 MHz	$V_{BE(SAT)}$ 1/ I_C = 5 A dc I_B = 0.5 A dc 1/	$V_{CE(SAT)}$ 1/ I_C = 5 A dc I_B = 0.5 A dc 1/
			pF		V dc	V dc
Min	40	10		1.5		
Max	120		350	7.5	1.5	0.6

1/ Pulsed (see 4.5.1).

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

MILITARY

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Document 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 specification and the references cited herein, the text of this specification shall take 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. 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 on figure 1 herein.

3.3.1 Lead material and finish. Lead material shall be Kovar, Alloy 52 or approved equivalent. Lead finish shall be gold plated, tin plated, or solder dipped. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

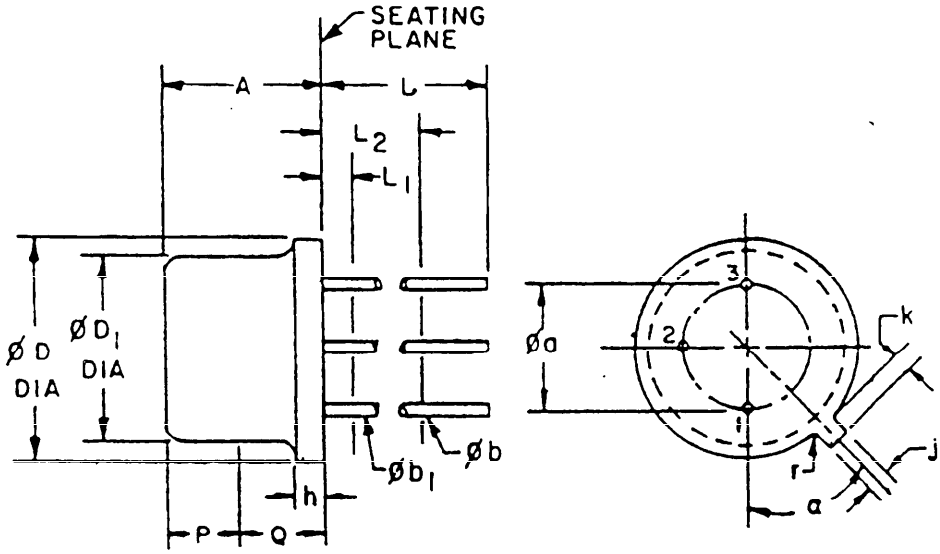


FIGURE 1. Physical dimensions.

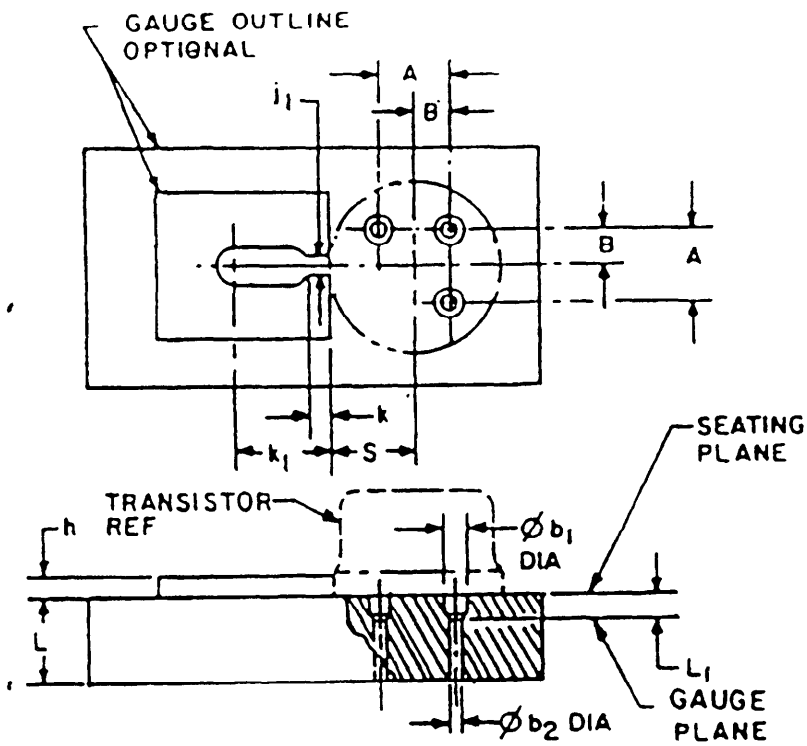
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.240	.260	6.10	6.60	
ϕa	.200 TP		5.08 TP		10
ϕb	.016	.021	0.41	0.53	11
ϕb_1	.016	.019	0.41	0.48	11
ϕD	.335	.370	8.51	9.40	
ϕD_1	.305	.335	7.75	8.51	
h	.009	.041	0.23	1.04	
j	.028	.034	0.71	0.86	4,6
k	.029	.045	0.74	1.14	6,7
L	See notes 11, 13, and 14				
L_1		.050		1.27	11
L_2	.250		6.35		11
P	.100		2.54		9
Q		.050		1.27	8
r		.010		0.25	12
α	45° TP		45°TP		10

FIGURE 1. Physical dimensions - Continued.

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Refer to rules for dimensioning Semiconductor Product Outlines included in Publication No. 76.
4. Lead number 4 omitted on this variation.
5. Tab shown omitted.
6. Beyond r maximum, j must be held to a minimum length of .021 (0.53 mm).
7. K measured from maximum ⌀D.
8. Details of outline in this zone optional.
9. $\text{⌀}D_1$ shall not vary more than .010 (0.25 mm) in zone P. This zone is controlled for automatic handling.
10. Leads at gauge plane .054-.055 (1.37-1.40 mm) below seating plane shall be within .007 (0.18 mm) radius of true position (TP) at a maximum material condition (MMC) relative to the tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedure described on gauge drawing on figure 2.
11. $\text{⌀}b_1$ applies between L_1 and L_2. ⌀applies between L_2 and L minimum. Diameter is uncontrolled in L_1 and beyond L minimum.
12. r (radius) applies to both inside corners of tab.
13. For transistor types 2N4150S, 2N5237S, dimension L is .500 (12.70 mm) minimum, and .750 (19.05 mm) maximum.
14. For transistor types 2N4150, 2N5237, and 2N5238, dimension L is 1.500 (38.10 mm) minimum, and 1.750 (44.45 mm) maximum.

FIGURE 1. Physical dimensions - Continued.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.1409	.1419	3.578	3.604
B	.0702	.0712	1.785	1.808
S	.182	.199	4.62	5.05
k	.009	.011	0.23	0.28
k_1	.125 Nom		3.18 Nom	
L_1	.054	.055	1.37	1.40
L	.372	.378	9.45	9.60
j_1	.0350	.0355	0.889	0.902
h	.150 Nom		3.81 Nom	
ϕb_2	.0325	.0335	0.824	0.851
ϕb_1	.0595	.0605	1.511	1.537

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The following gauging procedure shall be used: The use of a pin straightener prior to insertion in the gauge is permissible. The device being measured shall be inserted until its seating plane is .125 ±.010 (3.18 ±0.25 mm) from the seating surface of the gauge. A spacer may be used to obtain the .125 (3.18 mm) distance from the gauge seat prior to force application. A force of 8 oz ±.50 oz shall then be applied parallel and symmetrical to the device's cylindrical axis. When examined visually after the force application (the force need not be removed), the seating plane of the device shall be seated against the gauge.
4. The location of the tab locator, within the limits of dimension 3, will be determined by the tab and flange dimension of the device being checked.

FIGURE 2. Gauge for lead and tab location.

3.4 Marking. Marking shall be in accordance with MIL-S-19500 except at the option of the manufacturer, the following marking may be omitted from the body of the device.

a. Country of origin.

b Manufacturer's identification.

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 Group E inspection. Group E inspection shall be conducted in accordance with MIL-S-19500, and table IV herein.

4.3 Screening (JANTX, JANTXV, and JANS 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 and table II herein shall not be acceptable.

Screen (see table II of MIL-S-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
9	I_{CBO} and h_{FE1}	Not applicable
11	I_{CBO} and h_{FE1}; ΔI_{CBO} = 50 nA dc or ±100% from the initial value whichever is greater; $\Delta h_{FE1} = {+20 \atop -10}$ %	I_{CBO} and h_{FE2}
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein; ΔI_{CBO} = 50 nA dc or ±100% from the initial value whichever is greater; $\Delta h_{FE1} = {+20 \atop -10}$ %.	Subgroup 2 of table I herein; $\Delta h_{FE2} = {+20 \atop -10}$ %; ΔI_{CBO} = 50 nA dc or ±100% from the initial value whichever is greater.

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

T_A = room ambient as defined in the general requirements of MIL-STD-750, paragraph 4.5;
V_{CB} = 10 V dc; P_T = 1.0 W

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

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 III herein.)

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IVa (JANS) and table IVb (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 III herein.

4.4.2.1 Group B inspection, Table IVa of MIL-S-19500.

a. Subgroup 4.

Intermittent operation life; method 1037; Conditions: T_A = 25°C ±3°C; V_{CB} = 10 V dc; P_T = 1.0 W, t_{on} = t_{off} = 3 minutes minimum for 2,000 cycles. No heat sink nor forced air cooling on the device shall be permitted.

b. Subgroup 5

Accelerated steady-state reverse bias; method 1027; conditions: V_{CB} = 10 V dc; P_T = 1.0 W at T_A = 100°C (or P_T = 1.43 W at T_A = 25°C) for 96 hours.

4.4.2.2 Group B inspection, Table IVb of MIL-S-19500.

a. Subgroup 3

Steady-state operation life; method 1027; Conditions: V_{CB} = 10 V dc; P_T = 1.0 W at T_A = 25°C ±3°C. No heat sink nor forced air cooling on the device shall be permitted.

Bond strength; method 2037; Test condition A; All internal leads for each device shall be pulled separately.

b. Subgroup 5

Thermal resistance; method 3131; See 4.5.2

c. Subgroup 6

High-temperature life (nonoperating); method 1032; T_{STG} = +200°C.

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

4.4.3.1 Group C inspection, Table V of MIL-S-19500.

a. Subgroup 2

Terminal strength (tension); method 2036; test condition E.

b. Subgroup 6

Steady-state operation life; method 1026; Conditions: V_{CB} = 10 V dc; P_T = 1.0 W at T_A = 25°C ±3°C. No heat sink nor forced air cooling on the device shall be permitted.

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 MIL-STD-750.

4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3131 of MIL-STD-750. The maximum limit of $\Theta_{JC(max)}$ shall be 20°C/W. The following test conditions shall apply:

a. I_M: Measurement current - - - - - - - - - - - - - - - - - 10 mA

b. V_{CE}: Measurement current (same as V_H) - - - - - - - - - - 10 V

c. I_H: Collector heating current - - - - - - - - - - - - - - 0.375 A

d. V_H: Collector-emitter heating voltage - - - - - - - - - - 10 V

e. t_H: Heating time - 1.0 s

f. t_{MD}: Measurement delay time - - - - - - - - - - - - - - - 30 to 60 µs

g. t_{SW}: Sampling window time - - - - - - - - - - - - - - - - 10 µs max

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Breakdown voltage collector to base	3001	Bias condition D I_C = 10 µA dc	$V_{(BR)CBO}$			
2N4150, 2N4150S				100		V dc
2N5237, 2N5237S				150		V dc
2N5238, 2N5238S				200		V dc
Breakdown voltage collector to emitter	3011	Bias condition D I_C = 0.1 A dc, pulsed (see 4.5.1)	$V_{(BR)CEO}$			
2N4150, 2N4150S				70		V dc
2N5237, 2N5237S				120		V dc
2N5238, 2N5238S				170		V dc
Breakdown voltage emitter to base	3026	Bias condition D I_E = 10 µA dc	$V_{(BR)EBO}$	7		V dc
Collector to emitter cutoff current	3041	Bias condition D	I_{CEO1}			
2N4150, 2N4150S		V_{CE} = 60 V dc			10	µA dc
2N5237, 2N5237S		V_{CE} = 110 V dc			10	µA dc
2N5238, 2N5238S		V_{CE} = 160 V dc			10	µA dc
Collector to emitter cutoff current	3041	Bias condition A V_{BE} = 0.5 V dc	I_{CEX}			
2N4150, 2N4150S		V_{CE} = 100 V dc			10	µA dc
2N5237, 2N5237S		V_{CE} = 150 V dc			10	µA dc
2N5238, 2N5238S		V_{CE} = 200 V dc			10	µA dc
Emitter to base cutoff current	3061	Bias condition D V_{EB} = 5 V dc	I_{EBO}		0.1	µA dc
Collector to base cutoff current	3036	Bias condition D V_{CB} = 80 V dc	I_{CBO}		0.1	µA dc
Forward-current transfer ratio	3076	V_{CE} = 5 V dc I_C = 1 A dc pulsed (see 4.5.1)	h_{FE1}			
2N4150, 2N4150S				50	200	
2N5237, 2N5237S				50	225	
2N5238, 2N5238S				50	225	

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 2 - Continued						
Forward-current transfer ratio	3076	V_{CE} = 5 V dc I_C = 5 A dc pulsed (see 4.5.1)	h_{FE2}	40	120	
Collector to emitter voltage (saturated)	3071	I_C = 5 A dc I_B = 0.5 A dc pulsed (see 4.5.1)	$V_{CE(sat)1}$	---	0.6	V dc
Collector to emitter voltage (saturated)	3071	I_C = 10 A dc I_B = 1 A dc pulsed (see 4.5.1)	$V_{CE(sat)2}$	---	2.5	V dc
Base emitter voltage saturation	3066	Test condition A I_B = 0.5 A dc I_C = 5 A dc pulsed (see 4.5.1)	$V_{BE(sat)1}$	---	1.5	V dc
Base emitter voltage saturation	3066	Test condition A I_B = 1 A dc I_C = 10 A dc pulsed (see 4.5.1)	$V_{BE(sat)2}$	---	2.5	V dc
Forward-current transfer ratio	3076	V_{CE} = 5 V dc I_C = 10 A dc pulsed (see 4.5.1)	h_{FE3}	10	---	---
Subgroup 3						
High-temperature operation		T_C = +150°C				
Collector to emitter cutoff current	3041	Bias condition A V_{BE} = -0.5 V dc	I_{CEX2}			
2N4150, 2N4150S		V_{CE} = 80 V dc		---	100	µA dc
2N5237, 2N5237S		V_{CE} = 150 V dc		---	100	µA dc
2N5238, 2N5238S		V_{CE} = 200 V dc		---	100	µA dc
Low-temperature operation:		T_A = -55°C				
Forward current transfer ratio	3076	V_{CE} = 5 V dc I_C = 5 A dc pulsed (see 4.5.1)	h_{FE4}	20	---	---

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4						
Magnitude of common emitter small-signal short-circuit forward-current transfer ratio	3306	V_{CE} = 10 V dc I_C = 0.2 A dc f = 10 MHz	$\|h_{fe}\|$	1.5	7.5	---
Small-signal short-circuit forward-current transfer ratio	3206	V_{CE} = 5 V dc I_C = 50 mA dc f = 1 kHz	h_{fe}			
2N4150, 2N4150S				40	160	
2N5237, 2N5237S				40	160	
2N5238, 2N5238S				40	250	
Open circuit output capacitance	3236	V_{CB} = 10 V dc I_E = 0 100 ≤ f ≤ 1 MHz	C_{obo}		350	pF
Pulse response	3251	Test condition A				
Delay time		See figure 4	t_d		50	ns
Rise time		See figure 4	t_r		500	ns
Storage time		See figure 4	t_s		1.5	µs
Fall time		See figure 4	t_f		500	ns
Subgroup 5						
Safe operating area (continuous dc)	3051	T_C = +25°C t = 1.0 s				
Test 1		V_{CE} = 40 V I_C = 0.22 A				
Test 2		V_{CE} = 70 V I_C = 90 mA				
Test 3						
2N5237, 2N5237S only		V_{CE} = 120 V I_C = 15 mA				
2N5238, 2N5238S only		V_{CE} = 170 V I_C = 3.5 mA				

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 5 - Continued						
Clamped inductive sweep	3053	T_C = 100°C minimum I_B = 0.5 A dc I_C = 5 A dc (see figure 5)				
Electrical measurements		See table III, steps 1 and 4				

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

TABLE II. Group E inspection.

Inspection	MIL-STD-750		Qualification and large lot quality conformance inspection
	Method		
Subgroup 1			45 devices, c = 1
Temperature cycling	1051	Condition G, 500 cycles	
Hermetic seal Fine leak Gross leak	1071		
Electrical measurement		See table III, steps 1, 2, 3, 4, 5, 6, 7, and 8	
Subgroup 2 1/			45 devices, c = 1
Steady-state reverse bias	1039	Test condition A, 340 hours	
Electrical measurement		See table III, steps 1, 2, 3, 4, 5, 6, and 7	
Subgroup 3			
Destructive physical analysis 2/	2102		3 devices, c = 0
Subgroup 4			5 devices, c = 0
Thermal resistance	3131	$R_{\theta JC}$ = .020°C/mW, see 4.5.2	
Subgroup 5			
Not applicable			

1/ A separate sample may be used for each test.
2/ To apply after date of initial release of test method.

TABLE III. Groups A, B, C, and E electrical measurements. 1/ 2/ 3/

Step	Inspection	MIL-STD-750 Method	MIL-STD-750 Conditions	Symbol	Limits Min	Limits Max	Unit
1	Collector to base cutoff current	3036	Bias condition D; V_{CB} = 80 V dc	I_{CBO}		0.1	µA dc
2	Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 5 V dc	I_{EBO}		0.1	µA dc
3	Forward current transfer ratio	3076	V_{CE} = 5 V dc I_C = 1 A dc	h_{FE1}			
	2N4150, 2N4150S 2N5237, 2N5237S 2N5238, 2N5238S				150 50 50	200 225 225	
4	Forward current transfer ratio	3076	V_{CE} = 5 V dc I_C = 5 A dc pulsed (see 4.5.1)	h_{FE2}	40	120	
5	Collector to emitter voltage (saturated)	3071	I_C = 5 A dc I_B = 0.5 A dc pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.6	V dc
6	Base emitter voltage (saturated)	3066	Test condition A; I_C = 5 A dc pulsed (see 4.5.1)	$V_{BE\ (sat)1}$		1.5	V dc
7	Forward current transfer ratio	3076	V_{CE} = 5 V dc I_C = 1 A dc pulsed (see 4.5.1)	Δh_{FE1}		+20 change -10% from previously measured value	
8	Forward current transfer ratio	3076	V_{CE} = 5 V dc I_C = 5 A dc pulsed (see 4.5.1)	Δh_{FE2}		+20 change -10% from previously measured value	
9	Collector to base cutoff current	3036	Bias condition D; V_{CB} = 80 V dc	ΔI_{CBO}		±100% or 50 nA dc, whichever is greater	
10	Collector to emitter voltage (saturated)	3071	I_C = 5 A dc I_B = 0.5 A dc pulsed (see 4.5.1)	$\Delta V_{CE(sat)1}$		±50 mV dc change from previously measured value	

1/ The electrical measurements for table IVa (JANS) of MIL-S-19500 are as follows.
- a. Subgroup 3, see table III herein, steps 1, 4, 5, 6, and 10.
- b. Subgroup 4, see table III herein, steps 1, 4, 5, 6, and 10.
- c. Subgroup 5, see table III herein, steps 1, 2, 4, 5, 6, 8, 9, and 10.

2/ The electrical measurements for table IVb (JANTX and JANTXV) of MIL-S-19500 are as follows.
- a. Subgroup 2, see table III herein, steps 1, 2 and 4.
- b. Subgroup 3, see table III herein, steps 1, 2 and 8.
- c. Subgroup 6, see table III herein, steps 1, 2 and 8.

3/ The electrical measurements for table V of MIL-S-19500 are as follows:
- a. Subgroup 2, see table III herein, steps 1, 2 and 4.
- b. Subgroup 3, see table III herein, steps 1, 2 and 4.
- c. Subgroup 6, see table III herein, steps 1, 2 and 8.

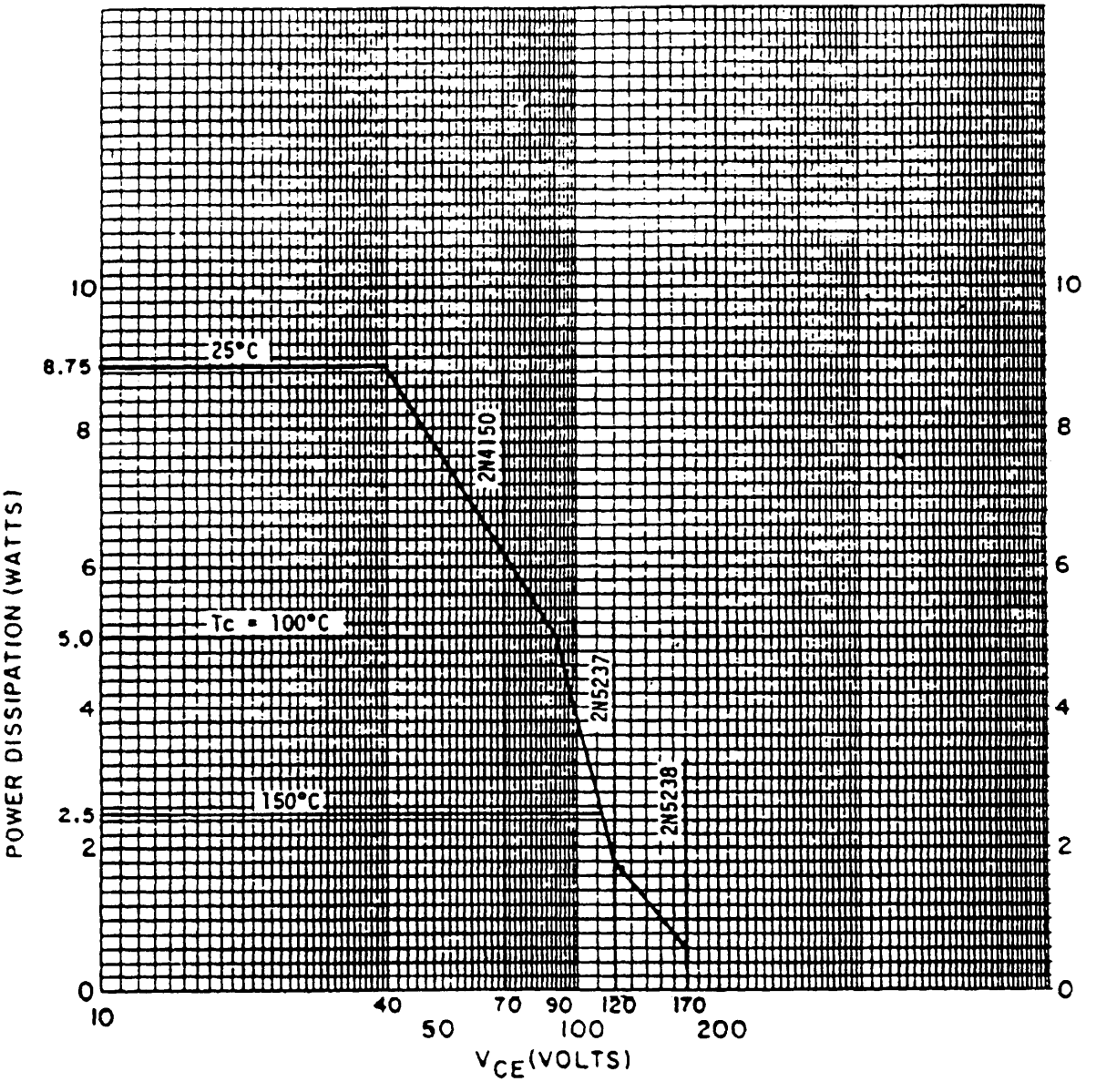
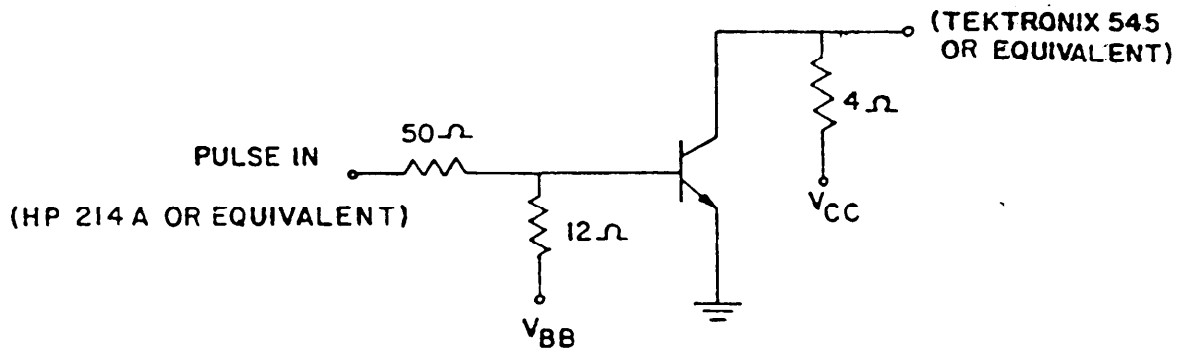


FIGURE 3. Maximum operating conditions - dc forward biased mode.

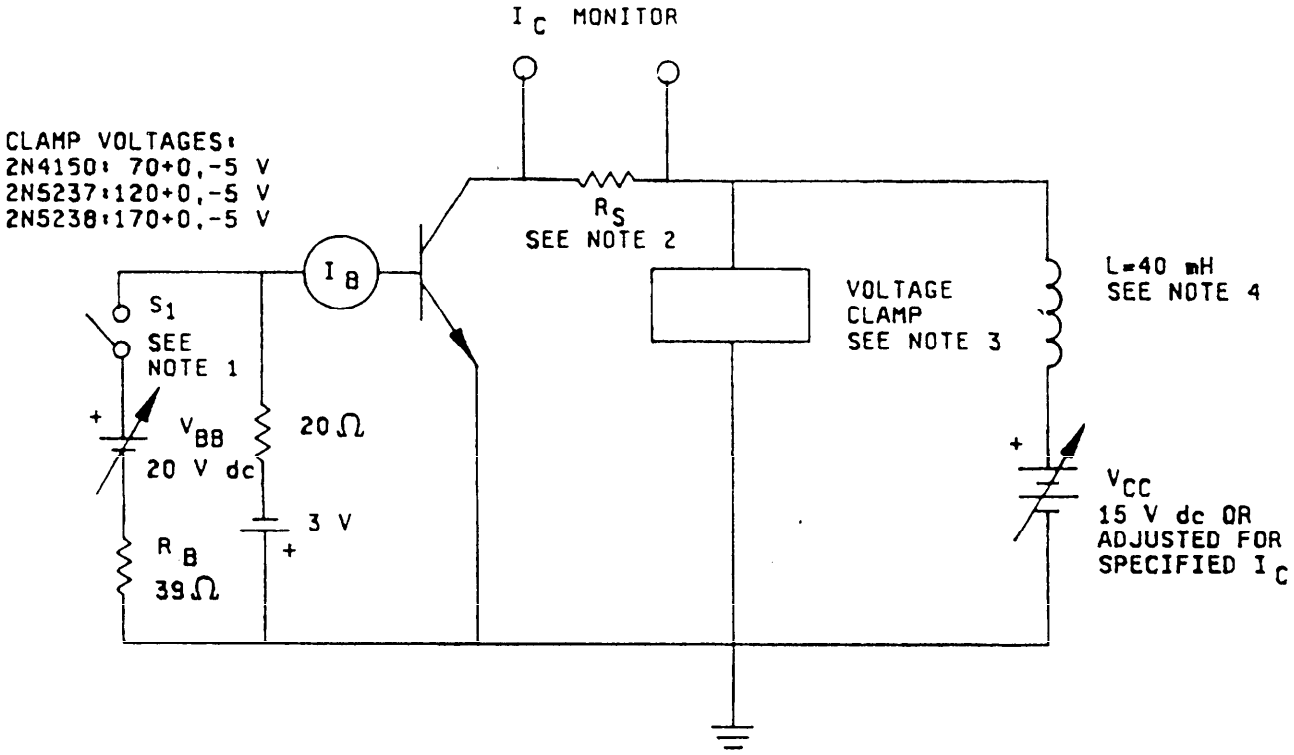


INPUT PULSE $V_P \approx 50$ V
PULSE WIDTH $\geq 10\ \mu s$ $t_r \leq 20$ ns
DUTY CYCLE $\leq 2\%$ $t_f \leq 20$ ns

$V_{CC} \approx 20$ V
$V_{BB} \approx 5$ V
$I_C = 5$ A

$I_{B1} = 0.5$ A
$I_{B2} = -0.5$ A

FIGURE 4. Speed of response test circuit.



NOTES:
1. An appropriate pulse generator may be substituted.
2. $R_S \leq 1.0\Omega$ noninductive.
3. Clamp voltages: 2N4150: 70 +0, -5 V; 2N5237: 120 +0, -5 V; 2N5238: 170 +0, -5 V.
4. STANCOR C-2691 or equivalent; 2 in series.

FIGURE 5. Clamped inductive sweep 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 or explanatory nature that may be helpful, but is not mandatory.)

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

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Issue of DODISS to be cited in the solicitation.

b. Lead finish may be specified (see 3.3.1).

c. Type number designation and quality product assurance level.

6.3 Substitution information. Devices covered by this specification are substitutable for the manufacturer's and user's PIN. This information in no way implies that manufacturer part or identifying numbers are suitable as a substitute for the military PIN's.

6.3.1 JANTX substitution. JANTX devices shall be a direct replacment for JAN devices (example JANTX2N4150 for JAN2N4150).

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

CONCLUDING MATERIAL

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

Review activities:
Army - MI
Air Force - 19, 85, 99
NASA - LRC, MSF
DLA - ES

User activities:
Air Force - 13, 15

Preparing activity:
NASA - NA

Agent:
DLA - ES

(Project 5961-1412)

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	2. DOCUMENT DATE (YYMMDD)
	MIL-S-19500/394B	

3. DOCUMENT TITLE Semiconductor Device, Transistor, NPN, Silicon, Power Switching, types 2N4150, 2N5237, 2N5238, 2N4150S, 2N5237S, 2N5238S JANTX, JANTXV, and JANS

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)	
Defense Electronic Supply Center ATTN: DESC-ELDT Dayton, OH 45444-5765	(1) Commercial 513-296-6048	(2) AUTOVON 986-6048
c. ADDRESS (Include Zip Code)	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	

DD Form 1426, OCT 89 *Previous editions are obsolete*