The documentation and process conversion measures necessary to comply with this revision shall be completed by 1 November 1997

INCH-POUND

MIL-PRF-19500/441E
1 August 1997
SUPERSEDING
MIL-S-19500/441D
3 May 1993

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER
TYPES 2N3740 AND 2N3741,
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. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-PRF-19500, and two levels of product assurance for each unencapsulated device type die.

1.2 Physical dimensions. See figure 1, TO-213AA (formerly TO-66) encapsulated devices, figures 2 and 3 for unencapsulated devices (JANHC and JANKC).

1.3 Maximum ratings.

Types	P_T 1/		V_{CBO}	V_{CEO}	V_{EBO}	I_B	I_C	T_{STG} and T_J
	T_C = +25°C	T_C = +100°C						
	W	W	V dc	V dc	V dc	V dc	V dc	°C
	25	14			7	2	4	-65 to +200
2N3740			60	60				
2N3741			80	80				

1/ Derate at 143 mW/°C above T_C = +25°C.

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

Limits	h_{FE2} 1/	h_{FE4} 1/	$\|h_{fe}\|$	$V_{CE(sat)2}$ 1/	C_{obo}	Pulse response		$R_{\theta JC}$
	V_{CE} = 1 V dc	V_{CE} = 1 V dc	V_{CE} = 10 V dc	I_C = 1.0 A dc	V_{CB} = 10 V dc	t_{on}	t_{off}	
	I_C = 250 mA dc	I_C = 1 A dc	I_C = 100 mA dc f = 5 MHz	I_B = 125 mA dc	I_E = 0 100 kHz ≤ f ≤ 1 MHz			
				V dc	pF	ns	µs	°C/W
Min	30	10	1					
Max	120		12	0.6	100	400	1	7

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: NASA/Parts Project Office (NPPO), NASA Goddard Space Flight Center, Code 310-A, Greenbelt, MD 20711 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.

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-PRF-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 Defense Printing Service Detachment Office, Building 4D (Customer Service), 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, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

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

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

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

3.4 Interface requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified in MIL-PRF-19500 and on figures 1, 2, and 3 herein. Current density of internal conductors shall be as specified in MIL-PRF-19500.

3.4.1 Lead material and finish. Lead material shall be Kovar or Alloy 52. Lead finish shall be solderable as defined in MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

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

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

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3.

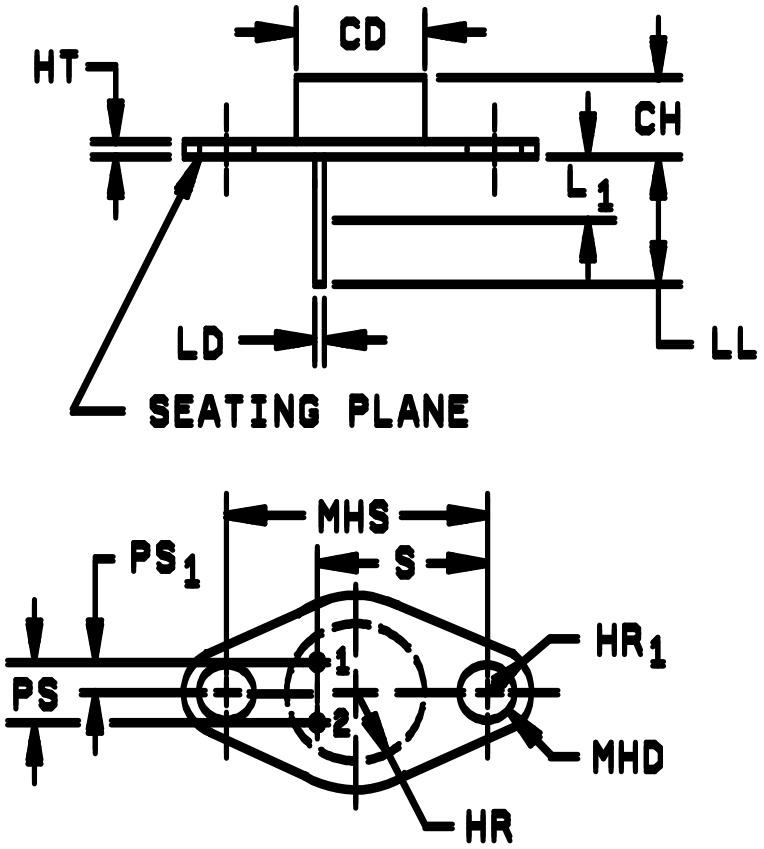
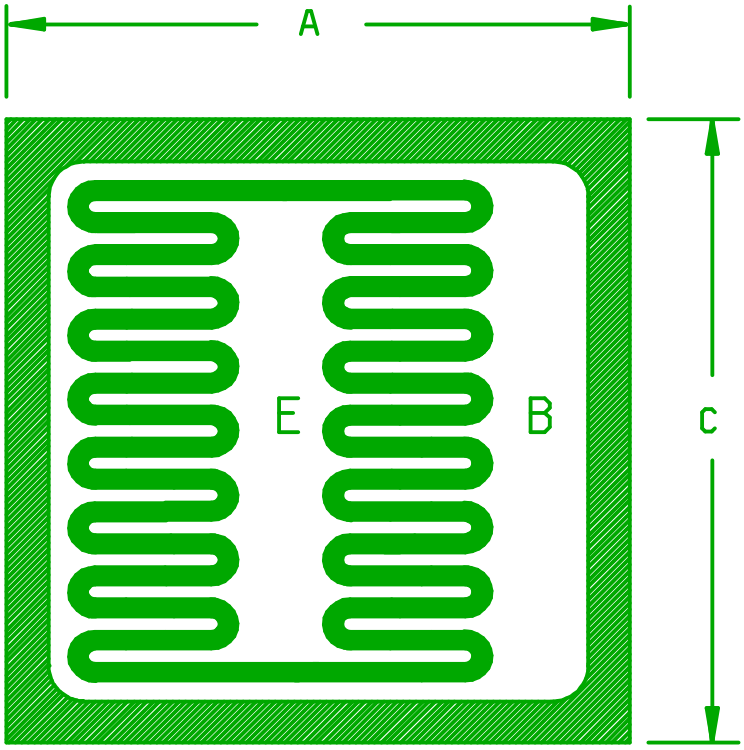


FIGURE 1. Physical dimensions, TO-213AA.

Symbol	Dimensions		Notes	Symbol	Dimensions		Notes
	Inches				Inches		
	Min	Max			Min	Max	
CD	- - -	.620 (15.75)	3, 10	LL	.360 (9.14)	.500 (12.70)	5, 9
CD_1	.470 (11.94)	.500 (12.70)	3, 10	L_1	- - -	.050 (1.27)	5, 9
CH	.250 (6.35)	.340 (8.54)		MHD	.142 (3.61)	.152 (3.86)	7, 10
HT	.050 (1.27)	.075 (1.91)	3	MHS	.958 (24.33)	.962 (24.43)	
HT_1	- - -	.050 (1.27)	3	PS	.190 (4.83)	.210 (5.33)	4
HR	- - -	.350 (8.89)		PS_1	.093 (2.36)	.107 (2.72)	4
HR_1	.115 (2.92)	.145 (3.68)	6	s_1	.570 (14.48)	.590 (14.99)	4
LD	.028 (0.71)	.034 (0.86)	5, 9, 10				

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are in parentheses.
3. Body contour is optional within zone defined by CD and CD_1.
4. These dimensions should be measured at points .050 to .055 below seating plane. When gauge is not used, measurement will be made at seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. The collector shall be electrically connected to the case.
9. LD applies between L_1 and LL. Diameter is uncontrolled in L_1.
10. In accordance with ANSI Y14.5M, diameters are equivalent to fx symbology.

FIGURE 1. Physical dimensions, TO-213AA.

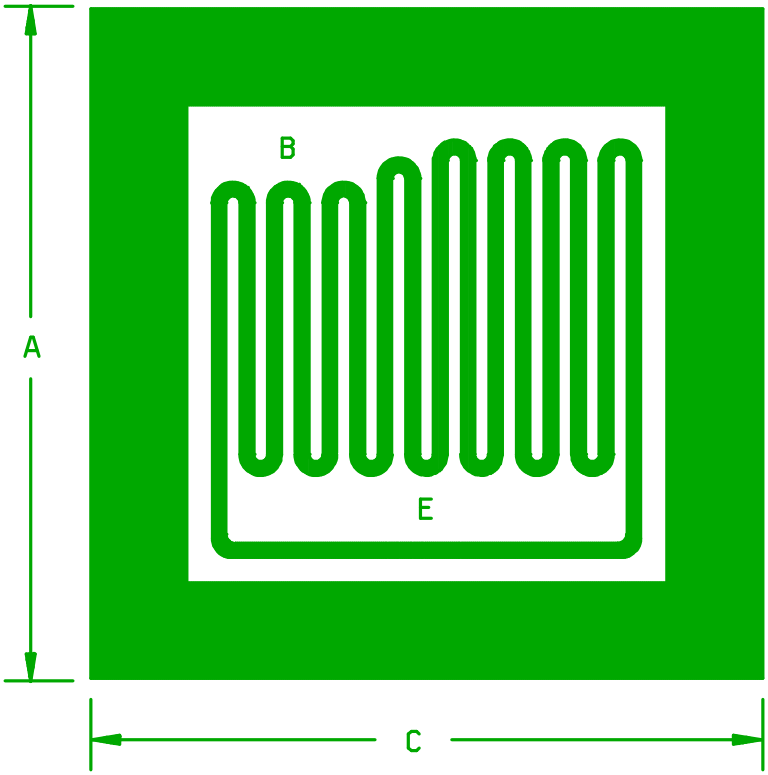


A - version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.059	.069	1.49	1.76
C	.059	.069	1.49	1.76

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die are:
   Thickness: .008 inch (0.20 mm) to .012 inch (0.30 mm).
   Top metal: Aluminum 25,000 Å minimum, 30,000 Å nominal.
   Back metal: Gold 2,500 Å minimum, 3,000 Å nominal.
   Back side: Collector.
   Bonding pad:
   B = .045 inch (1.14 mm) x .0075 inch (0.19 mm).
   E = .039 inch (0.99 mm) x .0075 inch (0.19 mm).
4. Element evaluation shall be performed on case outline TO-213AA.

FIGURE 2. Physical dimensions, JANHC and JANKC die.



B - version

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.083	.087	2.11	2.21
C	.083	.087	2.11	2.21

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The physical characteristics of the die are:
   Thickness: .014 inch (0.36 mm) to .018 inch (0.46 mm).
   Top metal: Aluminum 20,000 Å minimum, 30,000 Å nominal 50,000 Å maximum.
   Back metal:
   T1 = 5,000 Å nominal ±2,000 Å; N1 = 10,000 Å nominal ±2,000 Å;
   AG = 10,000 Å nominal ±2,000 Å.
   Back side: Collector.
   Bonding pad:
   B = .021 inch (0.53 mm) x .008 inch (0.20 mm) ±.002 inch (0.05 mm).
   E = .040 inch (1.01 mm) x .008 inch (0.20 mm) ±.002 inch (0.05 mm).
4. Element evaluation shall be performed on case outline TO-213AA.

FIGURE 3. Physical dimensions, JANHC and JANKC die.

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 devices. JANHC and JANKC devices are qualified in accordance with of MIL-PRF-19500.

4.3 Screening (JANS, JANTXV, and JANTX levels only). Screening shall be in accordance with appendix E, 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 appendix E, table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/	Thermal response (see 4.3.3)	Thermal response (see 4.3.3)
9	I_{CEX1} and h_{FE2}	Not applicable
11	I_{CEX1} and h_{FE2}; ΔI_{CEX1} = 100 percent of initial value or 50 nA dc, whichever is greater, Δh_{FE2} = ± 25 percent of initial value.	I_{CEX1} and h_{FE2}
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein; ΔI_{CEX1} = 100 percent of initial value or 50 nA dc; whichever is greater; Δh_{FE2} = ± 25 percent of initial value.	Subgroup 2 of table I herein; ΔI_{CEX1} = 100 percent of initial value or 50 nA dc, whichever is greater; Δh_{FE2} = ± 25 percent of initial value.

1/ This test shall be performed anytime before screen 9.

4.3.1 Power burn-in conditions. Power burn-in conditions (all levels) are as follows:
T_J = +187.5°C ± 12.5°C; V_{CB} = 25 ± 5 V dc; $T_A \leq$ +100°C.

4.3.2 Screening (JANHC and JANKC). Screening of JANHC and JANKC die shall be in accordance with MIL-PRF-19500. As a minimum, die shall be 100 percent probed in accordance with group A, subgroup 2.

4.3.3 Thermal response (ΔV_{BE} measurements). The ΔV_{BE} measurements shall be performed in accordance with MIL-STD-750, method 3131. The ΔV_{BE} conditions (I_H and V_H) and maximum limit shall be derived by each vendor. The chosen ΔV_{BE} measurement and conditions for each device in the qualification lot shall be submitted in the qualification report and a thermal response curve shall be plotted. The chosen ΔV_{BE} shall be considered final after the manufacturer has had the opportunity to test five consecutive lots. One-hundred percent safe operating area (SOA) testing may be performed in lieu of thermal response testing herein provided that the appropriate conditions of temperature, time, current, and voltage to achieve die attach integrity are approved by the qualifying activity. The following parameter measurements shall apply:

a.	I_M measurement	10 mA.
b.	V_{CE} measurement voltage	16 V (same as V_H).
c.	I_H collector heating current	1 A (minimum).
d.	V_H collector-emitter heating voltage	16 V (minimum).
e.	t_H heating time	10 ms.
f.	t_{MD} measurement delay time	50 µs.
g.	t_{SW} sample window time	10 µs (maximum).

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 appendix E, table V of MIL-PRF-19500, and table I herein. End-point electrical measurements shall be in accordance with the applicable steps of table II herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VIa (JANS) and table VIb (JANTX and JANTXV) of MIL-PRF-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, appendix E, table VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Conditions
B4	1037	Intermittent operation life (sampling plan); P_T = 3 W at T_A = +25°C, t_{on} = t_{off} = 3 minutes minimum for 2,000 cycles. No heat sink or forced air cooling on the device shall be permitted.
B5	1027	Steady-state operation life (sampling plan); $T_A \leq$ +150°C for 96 hours; P_T = 3 W at T_A = +100°C or adjusted as required by the chosen T_A to give an average lot T_J = +275°C.
B6	3131	Thermal resistance; see 4.5.2 herein.

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

Subgroup	Method	Conditions
B3	1037	Intermittent operation life (sampling plan); $V_{CB} \geq$ 10 V dc, ΔT_J between cycles ≥ +100°C, $t_{on} \geq$ 1 minute, $t_{off} \geq t_{on}$, for 2,000 cycles.

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

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

Subgroup	Method	Conditions
C2	2036	Terminal strength; test condition A, weight = 10 pounds, time = 15 s.
C6	1037	Intermittent operation life (sampling plan); $V_{CB} \geq 10$ V dc, ΔT_J between cycles $\geq +100°C$, $t_{on} \geq 1$ minute, $t_{off} \geq t_{on}$, for 6,000 cycles.

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 method 3131 of MIL-STD-750. The following details shall apply:

a	I_M measurement	10 mA.
b.	V_{CE} measurement voltage	16 V dc.
c.	I_H collector heating current	0.5 A, minimum.
d.	V_H collector-emitter heating voltage	16 V dc.
e.	t_H heating time	Steady-state (see MIL-STD-750, method 3131 for definitions) or 1.0 s minimum.
f.	t_{MD} measurement delay time	50 to 80 µs.
g.	t_{SW} sample window time	10 µs maximum

4.5.3 Inspection conditions. Unless otherwise specified, all inspections shall be conducted at a case temperature of +25°C ± 3°C.

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 emitter	3011	Bias condition D; I_C = 100 mA dc; pulsed (see 4.5.1)	$V_{(BR)CEO}$			
2N3740				60		V dc
2N3741				80		V dc
Collector to emitter cutoff current	3041	Bias condition D	I_{CEO}		10	µA dc
2N3740		V_{CE} = 40 V dc				
2N3741		V_{CE} = 60 V dc				
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 7 V dc	I_{EBO}		100	nA dc
Collector to emitter cutoff current	3041	Bias condition A; V_{BE} = 1.5 V dc	I_{CEX1}		300	nA dc
2N3740		V_{CE} = 60 V dc				
2N3741		V_{CE} = 80 V dc				
Collector to base cutoff current	3036	Bias condition D	I_{CBO}		100	nA dc
2N3740		V_{CE} = 60 V dc				
2N3741		V_{CE} = 80 V dc				
Base emitter voltage (nonsaturated)	3066	Test condition B; V_{CE} = 1 V dc; I_C = 250 mA dc pulsed (see 4.5.1)	V_{BE}		1	V dc
Saturation voltage and resistance	3071	I_C = 250 mA dc; I_B = 25 mA dc pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.4	V dc
Saturation voltage and resistance	3071	I_C = 1 A dc; I_B = 125 mA dc pulsed (see 4.5.1)	$V_{CE(sat)2}$		0.6	V dc
Forward-current transfer ratio	3076	V_{CE} = 1 V dc; pulsed (see 4.5.1)				
		I_C = 100 mA dc	h_{FE1}	40		
		I_C = 250 mA dc	h_{FE2}	30	120	
		I_C = 500 mA dc	h_{FE3}	20		
		I_C = 1 A dc	h_{FE4}	10		
Forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 4 A dc pulsed (see 4.5.1)	h_{FE5}	3		

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 3						
High temperature operation:		T_A = +150°C				
Collector to emitter cutoff current	3041	Bias condition A, V_{BE} = 1.5 V dc	I_{CEX2}		25	µA dc
2N3740		V_{CE} = 60 V dc				
2N3741		V_{CE} = 80 V dc				
Low temperature operation:	3076	T_A = -55°C				
Forward-current transfer ratio		V_{CE} = 1 V dc; I_C = 250 mA dc pulsed (see 4.5.1)	h_{FE6}	10		
Subgroup 4						
Small-signal short-circuit forward-current transfer ratio	3206	V_{CE} = 10 V dc; I_C = 50 mA dc; f = 1 kHz	h_{fe}	25	250	
Small-signal short-circuit forward-current transfer ratio	3306	V_{CE} = 10 V dc; I_C = 100 mA dc; f = 5 MHz	$\lvert h_{fe} \rvert$	1	12	
Open circuit output capacitance	3236	V_{CB} = 10 V dc; I_E = 0; 100 KHz ≤ f ≤ 1 MHz	C_{obo}		100	pF
Pulse response						
Turn-on time		I_C = 1 A dc; I_{B1} = 0.1 A dc (see figure 4)	t_{on}		400	ns
Turn-off time		I_C = 1 A dc; I_{B1} = I_{B2} = 0.1 A dc (see figure 4)	t_{off}		1	µs
Subgroup 5						
SOA (continuous dc)	3051	T_C = +25°C; power application time = 1 s; 1 cycle (see figure 5)				
Test 1		V_{CE} = 6.25 V dc; I_C = 4 A dc				
Test 2		V_{CE} = 20 V dc; I_C = 1.25 A 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	
Subgroup 5 - Continued						
Test 3		I_C = 150 mA dc				
2N3740		V_{CE} = 50 V dc				
2N3741		V_{CE} = 65 V dc				
SOA (clamped switching)		T_A = +25°C; V_{CC} = 15 V dc; duty cycle ≤ 5 percent, t_p = 1.5 ms (vary to obtain I_C), I_C = 4 A dc (see figures 6 and 7)				
2N3740		Clamp voltage = 60 V dc				
2N3741		Clamp voltage = 80 V dc				
End-point electrical measurements		See table II, steps 1 and 3				
SOA (switching)	3053	Load condition C (unclamped inductive) (see figure 8); T_A = +25°C; duty cycle ≤ 5 percent, R_S = 0.1Ω; $t_r = t_f \leq 500$ ns; R_{BB1} = 50 Ω; V_{BB1} = 10 V dc; R_{BB2} = ∞; V_{BB2} = 0; $V_{CC} \geq 20$ V dc				
Test 1		t_p = 375 µs (vary to obtain I_C); I_C = 1 A dc; L = 5 mH (min) at 1 A with maximum dc resistance of 0.5 Ω. For reference only: 2 ESSEX Stancor C-2688 (in parallel), or equivalent.				
Test 2		t_p = 1.5 ms (vary to obtain I_C); I_C = .25 A dc; L = 80 mH (min) at .25 A with a maximum dc resistance of 1 Ω. For reference only. ESSEX Stancor C-2691 or Triad C = 48				
SOA (clamped switching) (destructive)		T_A = +25°C; V_{CC} = 55 V dc (see figures 6 and 7); duty cycle ≤ 5 percent, t_p = 1.5 ms (vary to obtain I_C); I_C = 4 A dc				
2N3740		Clamp voltage = 60 V dc				
2N3741		Clamp voltage = 80 V dc				
End-point electrical measurements		See table II, steps 1 and 3				
Subgroups 6 and 7						
Not applicable						

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

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

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Collector to emitter cutoff current 2N3740 2N3741	3041	Bias condition A; V_{BE} = 1.5 V dc V_{CE} = 60 V dc V_{CE} = 80 V dc	I_{CEX1}		300	nA dc
2.	Collector to emitter cutoff current 2N3740 2N3741	3041	Bias condition A; V_{BE} = +1.5 V dc V_{CE} = 60 V dc V_{CE} = 80 V dc	I_{CEX2}		500	nA dc
3.	Forward-current transfer ratio	3076	V_{CE} = 1 V dc; I_C = 250 mA dc; pulsed (see 4.5.1)	h_{FE2}	30	120	
4.	Saturation voltage and resistance	3071	I_C = 250 mA dc; I_B = 25 mA dc pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.4	V dc
5.	Collector to emitter cutoff current 2N3740 2N3741	3041	Bias condition A; V_{BE} = 1.5 V dc V_{CE} = 60 V dc V_{CE} = 80 V dc	ΔI_{CEX1}		100 percent of initial value or 50 nA dc, whichever is greater.	
6.	Forward-current transfer ratio	3076	V_{CE} = 1 V dc; I_C = 250 mA dc; pulsed (see 4.5.1)	Δh_{FE2}		± 25 percent change from initial reading.	
7.	Saturation voltage and resistance	3071	I_C = 250 mA dc; I_B = 25 mA dc; pulsed (see 4.5.1)	$\Delta V_{CE(sat)1}$		50 mV dc change from initial value	
8.	Thermal response 4/	3131	See 4.3.3	ΔV_{BE}			

1/ The electrical measurements for appendix E, table VIa (JANS) of MIL-PRF-19500 are as follows:

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

b. Subgroup 4, table II, steps 1, 3, 4, 7, and 8.

c. Subgroup 5, table II, steps 1, 3, 4, 5, 6, 7, and 8.

TABLE II. Groups A, B, and C electrical measurements - Continued. 1/ 2/ 3/

2/ The electrical measurements for appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500 are as follows:

a. Subgroup 2, table II, steps 1 and 3.

b. Subgroup 3, table II, steps 2, 3, and 8.

c. Subgroup 6, table II, steps 2 and 3.

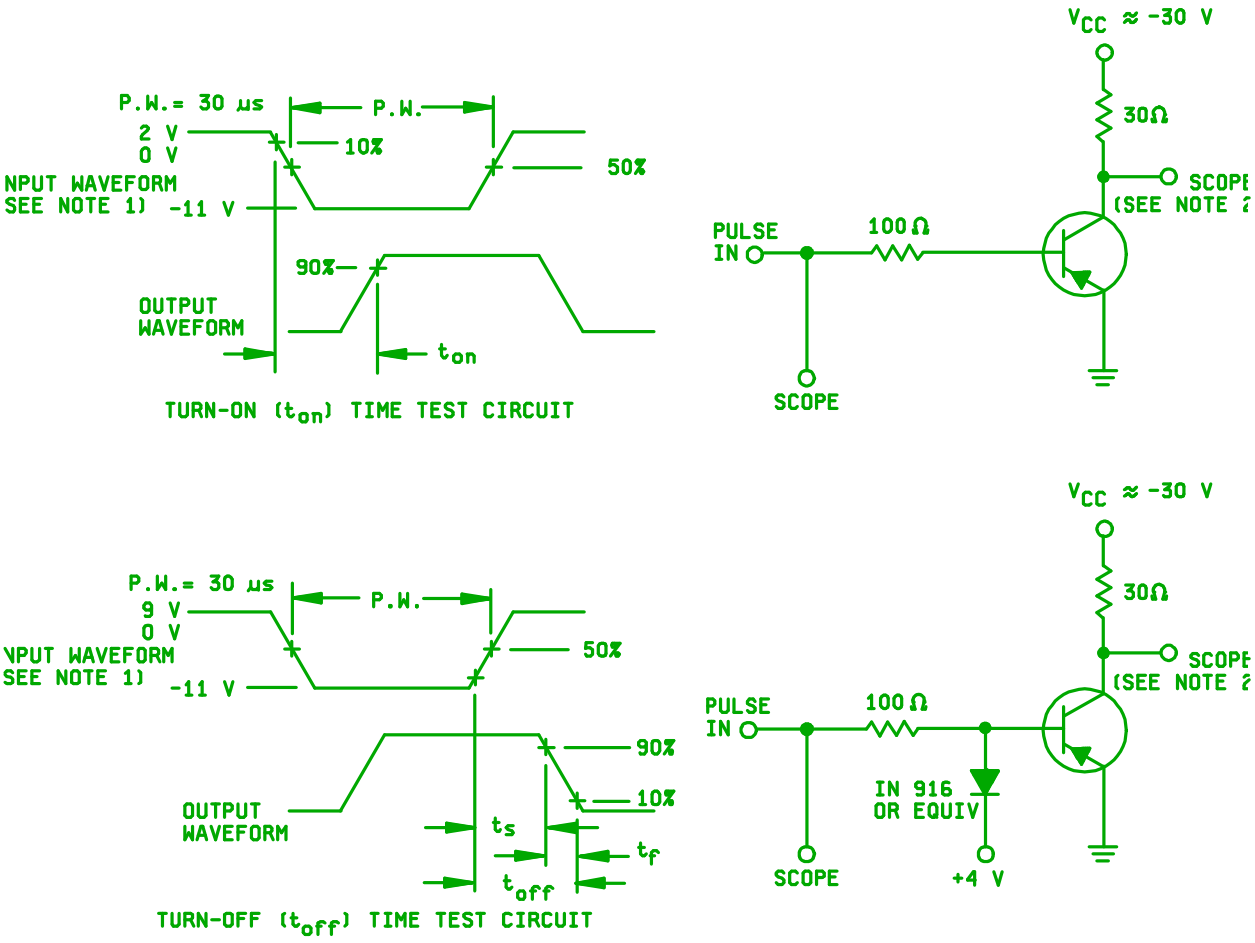
3/ The electrical measurements for appendix E, table VII of MIL-PRF-19500 are as follows:

a. Subgroup 2, table II, steps 1, 3, and 4 (JANS); steps 1 and 3 (JANTX and JANTXV).

b. Subgroup 3, table II, steps 1, 3, and 4 (JANS); steps 1 and 3 (JANTX and JANTXV).

c. Subgroup 6, table II, steps 1, 3, 4, 5, 6, and 8 (JANS); steps 2, 3, 6, and 8 (JANTX and JANTXV).

4/ SOA testing may be performed in lieu of thermal response testing herein provided that appropriate conditions of temperature, time, current, and voltage to achieve die attach integrity are submitted to the qualifying activity.



NOTES:

1. The rise time (t_r) of the applied pulse shall be ≤ 20 ns; duty cycle ≤ 2 percent; generator source impedance shall be 50 Ω.
2. Output sampling oscilloscope: Z_{in} ≥ 100 kΩ; C_{in} ≤ 12 pF; rise time ≤ 2 ns.

FIGURE 4. Pulse response test circuits.

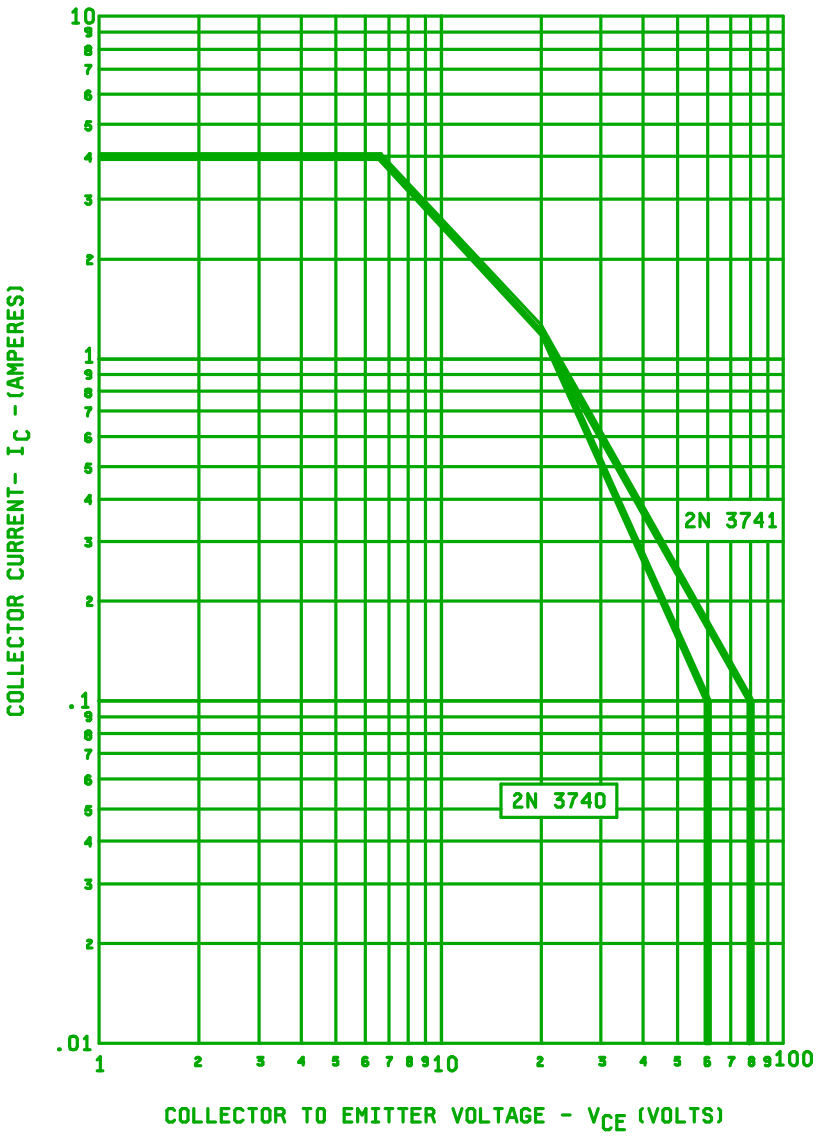
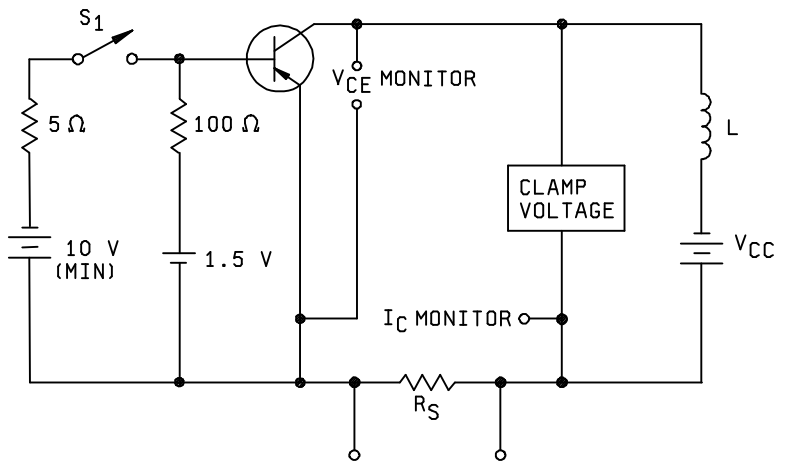


FIGURE 5. Maximum SOA graph (continuous dc).



$R_S \leq .1\ \Omega$ 12 W; 1 percent tolerance maximum (noninductive).

L = 5 mH at 4 A with a maximum dc resistance of 0.5 Ω.
Reference only: 2 ESSEX Stancor C-2688 (in parallel),
or equivalent.

Procedure

1. With switch S_1 closed, set the specified test conditions.
2. Open S_1. Device fails if the clamp voltage is not reached.
3. Perform specified end-point tests.

FIGURE 6. Clamped inductive sweep test circuit.

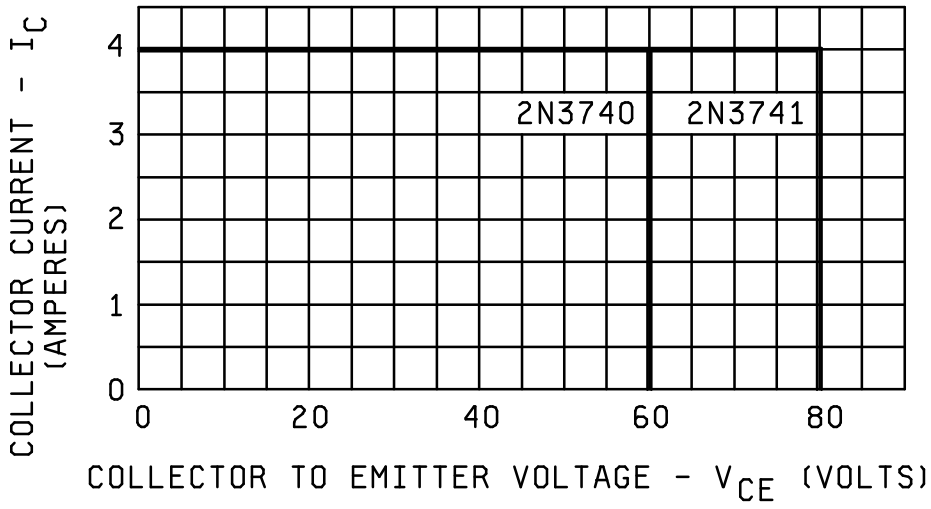


FIGURE 7. SOA for switching between saturation and cutoff (clamped inductive load).

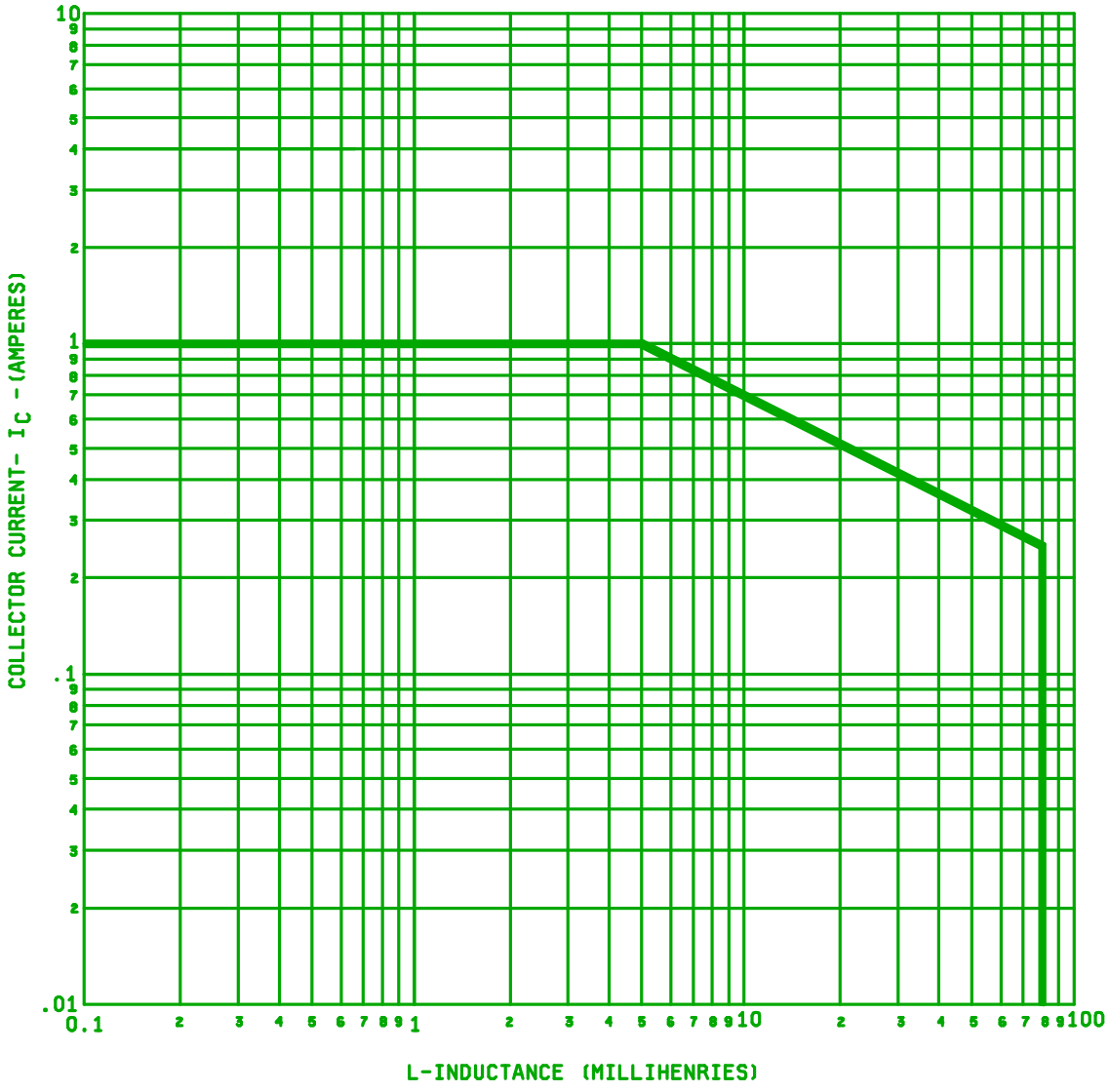


FIGURE 8. Safe operating area for switching between saturation and cutoff (unclamped inductive load).

5. PACKAGING

5.1 Packaging. Packaging shall prevent mechanical damage of the devices during shipping and handling and shall not be detrimental to the device. 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. See MIL- PRF-19500.

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 Products List QPL No.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, ATTN: DSCC-VQE, 3990 East Broad Street, Columbus, OH 43216-5000.

6.4 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA3740) will be identified on the Qualified Products List.

JANC ordering information		
PIN	Manufacturer	
	33178	43611
2N3740	JANHCA3740	JANHCB3740
2N3740	JANKCA3740	JANKCB3740
2N3741	JANHCA3741	JANHCB3741
2N3741	JANKCA3741	JANKCB3741

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 extent of the changes.

CONCLUDING MATERIAL

Custodians:
Army - CR
Navy - EC
Air Force - 17

Preparing activity:
DLA - CC

(Project 5961-1674)

Review activities:
Army - AR, AV, MI, SM
Navy - AS, CG, MC
Air Force - 13, 19, 85, 99

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-19500/441E	**2. DOCUMENT DATE (YYMMDD)** 970801

3. DOCUMENT TITLE
SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER TYPES 2N3740 AND 2N3741, 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

a. NAME Alan Barone	b. TELEPHONE (Include Area Code) (1) Commercial (614)692-0510 (2) AUTOVON 850-0510
c. ADDRESS (Include Zip Code) Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH 43216-5000	**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