

The documentation and process conversion measures necessary to comply with this document shall be completed by 11 August 2004.

INCH-POUND

MIL-PRF-19500/526E
 11 May 2004
 SUPERSEDING
 MIL-PRF-19500/526D
 30 August 1999

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, POWER,
 TYPE 2N3879, JAN, JANTX, AND JANTXV

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

* The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19500.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for NPN, silicon, power transistors. Three levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (TO-66).

1.3 Maximum ratings. ($T_A = +25^\circ\text{C}$, unless otherwise specified).

P_T (1) $T_C = +25^\circ\text{C}$	V_{CBO}	V_{CEO}	V_{EBO}	I_B	I_C	T_J and T_{STG}	$R_{\theta JC}$
<u>W</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>A dc</u>	<u>A dc</u>	<u>°C/W</u>	<u>°C/W</u>
35	120	75	7	5	7	-65 to +200	5

(1) Derate linearly 200 mW/°C for $T_C > +25^\circ\text{C}$.

* Comments, suggestions, or questions on this document should be addressed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, or emailed to Semiconductor@dsc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://www.dodssp.daps.mil/>.

1.4 Primary electrical characteristics.

	h_{FE1} (1)	h_{FE2} (1)	$V_{BE(SAT)1}$	$V_{CE(SAT)1}$	C_{obo}	$ h_{fe} $	Switching (see table 1 and figure 2 herein)	
	$V_{CE} = 5.0$ V dc $I_C = 0.5$ A dc	$V_{CE} = 5.0$ V dc $I_C = 4.0$ A dc	$I_C = 4.0$ V dc $I_B = 0.4$ A dc	$I_C = 4.0$ V dc $I_B = 0.4$ A dc	$V_{CB} = 10$ V dc $I_E = 0$ 0.1 MHz $\leq f \leq 1$ MHz	$V_{CE} = 10$ V dc $I_C = 500$ mA dc $f = 10$ MHz	t_{on}	t_{off}
			<u>V dc</u>	<u>V dc</u>	<u>pF</u>		<u>μS</u>	<u>μS</u>
Min	40	20	2.0	1.2	175	4	0.44	1.2
Max		80				20		

(1) Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 of documents cited in sections 3, 4, or 5 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 cited in the solicitation or contract.

* DEPARTMENT OF DEFENSE SPECIFICATIONS

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

* DEPARTMENT OF DEFENSE STANDARDS

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

* (Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

* 2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

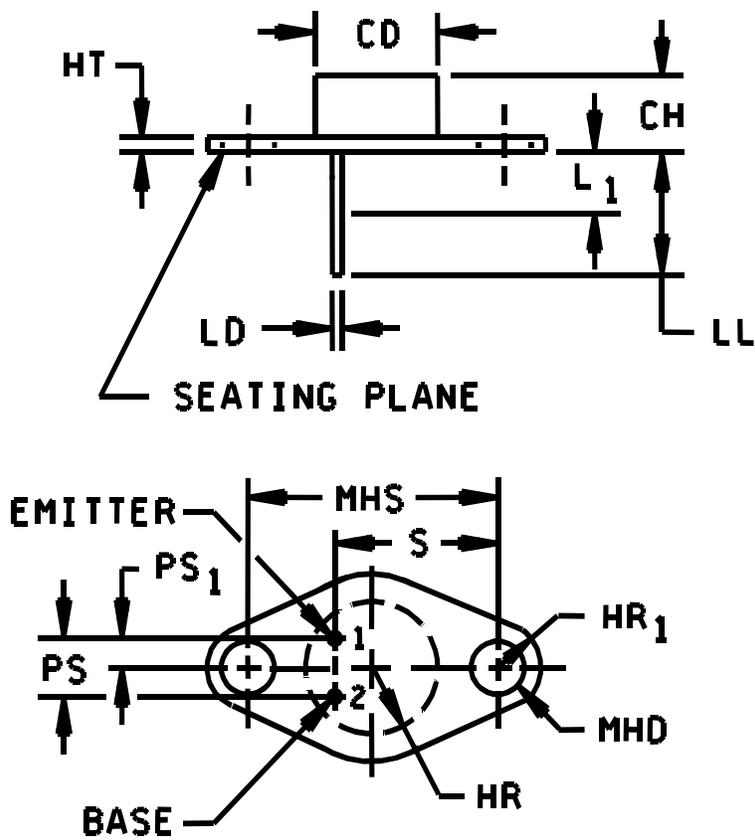


FIGURE 1. Physical dimensions (TO-66).

MIL-PRF-19500/526E

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CH	0.250	0.340	6.35	8.64	
LD	0.028	0.034	0.71	0.86	3,7,10
CD	0.470	0.500	11.94	12.70	3,10
PS	0.190	0.210	4.83	5.33	4
PS ₁	0.093	0.107	2.36	2.72	4
HT	0.050	0.075	1.27	1.91	
LL	0.360	0.500	9.14	12.70	3,9
L ₁		0.050		1.27	9
MHD	0.142	0.152	3.61	3.86	7,10
MHS	0.958	0.962	24.33	24.43	
HR		0.350		8.89	
HR ₁	0.115	0.145	2.92	3.68	8
S	0.570	0.590	14.48	14.99	

NOTES:

1. Dimensions are in inches.
- * 2. Millimeters are given for general information only.
3. Body contour is optional within zone defined by CD and PS₁.
4. These dimensions should be measured at points 0.050 inch (1.27 mm) 0.055 inch (1.40 mm) below seating plane. When gauge is not used measurement will be made at the seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. The collector is electrically connected to the case.
9. LD applies between L₁ and LL. Diameter is uncontrolled in L₁.
- * 10. In accordance with ASME Y14.5M, diameters are equivalent to \varnothing x symbology.

FIGURE 1. Physical dimensions (TO-66) - Continued.

3. REQUIREMENTS

* 3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

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

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

* 3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1.

3.4.1 Lead finish. Lead finish shall be solderable in accordance with 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, 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 as specified in table I.

* 3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3).

* c. Conformance inspection (see 4.4 and tables I and II).

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

* 4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

* 4.3 Screening (JANTX and JANTXV levels only). Screening shall be in accordance with table IV of MIL-PRF-19500 and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table IV of MIL-PRF-19500)	Measurement
	JANTX and JANTXV levels
(1) 3c	Thermal impedance (see 4.3.2)
9	I_{CEX1}
11	h_{FE2} ; I_{CEX1} ΔI_{CEX1} = 100 percent of initial value or 1 mA dc, whichever is greater.
12	See 4.3.1
15	ΔI_{CEX1} = 100 percent of initial value or 1 mA dc, whichever is greater. Δh_{FE2} = \pm 25 percent of initial value; subgroup 2 of table I herein.

(1) Thermal impedance shall be performed any time after sealing provided temperature cycling is performed in accordance with MIL-PRF-19500, screen 3a, prior to this thermal test.

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

$T_J = +187.5^\circ\text{C}$, $\pm 12.5^\circ\text{C}$; $V_{CB} = 10 - 30$ V dc; $T_A =$ room ambient as defined in the general requirements of 4.5 of MIL-STD-750.

* 4.3.2 Thermal impedance $Z_{\theta JX}$ measurements for screening. The $Z_{\theta JX}$ measurements shall be performed in accordance with method 3161 of MIL-STD-750. The maximum limit (not to exceed the table I, subgroup 2 limit) for $Z_{\theta JC}$ in screening (table II of MIL-PRF-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 bar 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. One hundred percent safe operating area (SOA) testing may be performed in lieu of thermal impedance testing herein provided that the appropriate conditions of temperature, time current, and voltage to achieve die attach integrity are submitted to the qualifying activity.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500 and table I herein. The following test conditions shall be used for $Z_{\theta JX}$, group A inspection: $Z_{\theta JX} \leq 5.0^{\circ}\text{C/W}$.

- a. I_M measurement current..... 1 to 10 mA.
- b. I_H forward heating current 0.5 A to 1.0 A.
- c. t_H heating time..... 10 ms.
- d. t_{MD} measurement delay time..... 70 μs maximum.

End-point electrical measurements shall be in accordance with table I, subgroup 2 herein.

* 4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified. Separate samples may be used for each step. In the event of a group B failure, the manufacturer may pull a new sample at double size from either the failed assembly lot or from another assembly lot from the same wafer lot. If the new assembly lot option is exercised, the failed assembly lot shall be scrapped. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

<u>Step</u>	<u>Method</u>	<u>Condition</u>
1	1039	Steady-state life: Test condition B, 340 hours, $V_{CB} = 10 - 30 \text{ V dc}$, $T_J = +150^{\circ}\text{C min}$. No heat sink or forced-air cooling on the devices shall be permitted. $n = 45$ devices, $c = 0$.
2	1039	The steady-state life test of step 1 shall be extended to 1,000 hours for each die design. Samples shall be selected from a wafer lot every twelve months of wafer production, however, group B shall not be required more than once for any single wafer lot. $n = 45$, $c = 0$.
3	1032	High-temperature life (non-operating), $t = 340$ hours, $T_A = +200^{\circ}\text{C}$, $n = 22$, $c = 0$.

4.4.2.1 Group B sample selection. Samples selected from group B inspection shall meet all of the following requirements:

- a. For JAN, JANTX, and JANTXV samples shall be selected randomly from a minimum of three wafers (or from each wafer in the lot) from each wafer lot. See MIL-PRF-19500.
- b. Must be chosen from an inspection lot that has been submitted to and passed table I, subgroup 2, conformance inspection. When the final lead finish is solder or any plating prone to oxidation at high temperature, the samples for life test (group B for JAN, JANTX, and JANTXV) may be pulled prior to the application of final lead finish.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Test condition A; weight = 10 pounds; t = 15 s.
* C5	3131	$R_{\theta JC} = 5^{\circ}\text{C/W}$.
C6		Not applicable

4.4.3.2 Group C sample selection. Samples for subgroups in group C shall be chosen at random from any lot containing the intended package type and lead finish procured to the same specification which is submitted to and passes group A tests for conformance inspection. Testing of a subgroup using a single device type enclosed in the intended package type shall be considered as complying with the requirements for that subgroup.

* 4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IX of MIL-PRF-19500 and as specified in table II herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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 measurements shall be as specified in section 4 of MIL-STD-750.

* 4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3131 of MIL-STD-750. $R_{\theta JC} (\text{max}) = 5^{\circ}\text{C/W}$.

- a. Collector current magnitude during power applications shall be 0.55 A dc.
- b. Collector to emitter voltage magnitude shall be 20 V dc.
- c. Reference temperature 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 header.

MIL-PRF-19500/526E

* TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1 2/</u>						
Visual and mechanical <u>3/</u> examination	2071	n = 45 devices, c = 0				
Solderability <u>3/</u>	2026	n = 15 leads, c = 0				
Resistance to <u>3/ 4/</u> solvent	1022	n = 15 devices, c = 0				
Temp cycling <u>3/</u>	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
* Hermetic seal Fine leak Gross leak	1071	n = 22 devices, c = 0 Test condition G or H Test condition C or D				
Electrical measurements		Table I, subgroup 2				
Bond strength <u>3/</u>	2037	Precondition T _A = +250°C at t = 24 hrs or T _A = +300°C at t = 2 hrs, n = 11 wires, c = 0				
* Decap internal visual	2075	n = 4, c = 0				
<u>Subgroup 2</u>						
* Breakdown voltage, collector to emitter	3011	Bias condition C; I _C = 200 mA dc; pulsed (see 4.5.1)	V _{(BR)CEO}	75		V dc
Thermal impedance	3131	See 4.3.2	Z _{θJX}		5.0	°C/W
Collector to emitter cutoff current	3041	Bias condition D; V _{CE} = 50 V dc	I _{CEO}		5	mA dc
* Collector to emitter cutoff current	3041	Bias condition A; V _{CE} = 100 V dc; V _{BE} = 1.5 V dc	I _{CEX1}		250	μA dc
Emitter to base cutoff current	3061	Bias condition D; V _{EB} = 7 V dc	I _{EBO}		10	mA dc
Collector to base cutoff current	3036	Bias condition D; V _{CB} = 120 V dc	I _{CBO}		25	mA dc
Base emitter voltage (nonsaturated)	3066	Test condition B; I _C = 4.0 A dc; V _{CE} = 2.0 V dc; pulsed (see 4.5.1)	V _{BE}		1.8	V dc
Base emitter voltage (saturated)	3066	Test condition A; I _C = 4.0 A dc; I _B = 0.4 V dc; pulsed (see 4.5.1)	V _{BE(SAT)}		2.0	V dc
Collector to emitter saturated voltage	3071	I _C = 4.0 A dc; I _B = 0.4 V dc; pulsed (see 4.5.1)	V _{CE(SAT)}		1.2	V dc

See footnotes at end of table.

MIL-PRF-19500/526E

* TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> continued						
Forward-current transfer ratio	3076	$V_{CE} = 5.0 \text{ V dc}; I_C = 0.5 \text{ A dc};$ pulsed (see 4.5.1)	h_{FE1}	40		
Forward-current transfer ratio	3076	$V_{CE} = 5.0 \text{ V dc}; I_C = 4.0 \text{ A dc};$ pulsed (see 4.5.1)	h_{FE2}	20	80	
Forward-current transfer ratio	3076	$V_{CE} = 2.0 \text{ V dc}; I_C = 4.0 \text{ A dc};$ pulsed (see 4.5.1)	h_{FE3}	12	100	
<u>Subgroup 3</u>						
High temperature operation:		$T_A = +150^\circ\text{C}$				
* Collector to emitter cutoff current	3041	Bias condition A; $V_{CE} = 100 \text{ V dc}; V_{BE} = 1.5 \text{ V dc}$	I_{CEX2}		750	$\mu\text{A dc}$
Low temperature operation:		$T_A = -55^\circ\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 5.0 \text{ V dc}; I_C = 0.5 \text{ A dc};$ pulsed (see 4.5.1)	h_{FE4}	10		
<u>Subgroup 4</u>						
Pulse response	3251	Test condition A except test circuit and pulse requirements in accordance with figure 2 herein.				
Turn-on time		$V_{CC} = 30 \text{ V dc};$ $I_C = 4.0 \text{ A dc}; I_B = 0.4 \text{ A dc}$	$t_{(on)}$		0.44	μs
Turn-off time		$V_{CC} = 30 \text{ V dc}; I_C = 4.0 \text{ A dc};$ $I_B = -I_B = 0.4 \text{ A dc}$	$t_{(off)}$		1.2	μs
Magnitude of common emitter small-signal short-circuit forward-current transfer ratio	3306	$V_{CE} = 10 \text{ V dc};$ $I_C = 500 \text{ mA dc};$ $f = 10 \text{ MHz}$	$ h_{ie} $	4	20	
Open circuit output capacitance	3236	$V_{CB} = 10 \text{ V dc}; I_E = 0;$ $0.1 \text{ MHz} \leq f \leq 1.0 \text{ MHz}$	C_{obo}		175	pF

See footnotes at end of table.

MIL-PRF-19500/526E

* TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 5</u>						
Safe operating area (continuous dc)	3051	$T_C = +25^\circ\text{C}$; $t = 1 \text{ s}$, 1 cycle; (see figure 3)				
Test 1		$V_{CE} = 5 \text{ V dc}$; $I_C = 7 \text{ A dc}$				
Test 2		$V_{CE} = 28 \text{ V dc}$; $I_C = 1.25 \text{ A dc}$				
Test 3		$V_{CE} = 40 \text{ V dc}$; $I_C = 500 \text{ mA dc}$				
Test 4		$V_{CE} = 75 \text{ V dc}$; $I_C = 100 \text{ mA dc}$				
Safe operating area (switching)	3053	Load condition C, (unclamped inductive load) (see figure 4) $T_C = +25^\circ\text{C}$; duty cycle ≤ 5 percent; $R_S = 0.1 \text{ ohm}$; $t_r = t_f \leq 2 \mu\text{s}$				
Test 1		$t_p \approx 50 \mu\text{s}$ (vary to obtain I_C); $R_{BB1} = 5.0 \text{ ohms}$; $V_{BB1} = 10 \text{ V dc}$; $R_{BB2} = 50 \text{ ohms}$; $V_{BB2} = 4 \text{ V dc}$; $I_C = 4 \text{ A dc}$; $L = 125 \mu\text{H}$; $V_{CC} = 10 \text{ V dc}$; R of inductor = 0.1 ohm				
Test 2		$t_p \approx 25 \mu\text{s}$ (vary to obtain I_C); $R_{BB1} = 5.0 \text{ ohms}$; $V_{BB1} = 10 \text{ V dc}$; $R_{BB2} = 50 \text{ ohms}$; $V_{BB2} = 1.5 \text{ V dc}$; $I_C = 1 \text{ A dc}$; $L = 250 \mu\text{H}$; $V_{CC} = 10 \text{ V dc}$; R of inductor = 0.1 ohm				
Safe operating area (switching)	3053	Load condition B; $T_A = +25^\circ\text{C}$; $I_C = 7 \text{ A dc}$; $V_{CC} = 45 \text{ V dc}$; Clamped voltage = 75 V dc , duty cycle ≤ 5 percent; $R_{BB1} = 5.0 \text{ ohms}$; $V_{BB1} = 10 \text{ V dc}$; $R_{BB2} = 50 \text{ ohms}$; $V_{BB2} = -4 \text{ V dc}$; $L = 250 \mu\text{H}$; R of inductor = 0.1 ohm ; $R_L =$ as required to limit I_C .				
<u>Subgroups 6 and 7</u>						
Not applicable						

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

2/ For resubmission of failed subgroup 1, double the sample size of the failed test or sequence of tests.

3/ Separate samples may be used.

4/ Not required for laser marked devices.

MIL-PRF-19500/526E

* TABLE II. Group E inspection (all quality levels) for qualification and re-qualification only.

Inspection	MIL-STD-750		Qualification conformance inspection
	Method	Conditions	
<u>Subgroup 1</u>			45 devices c = 0
Temperature cycling	1051	500 cycles	
Hermetic seal Fine leak Gross leak	1071	Test condition G or H, Test condition C or D	
Electrical measurements		Table I, subgroup 2	
<u>Subgroup 2</u>			45 devices c = 0
High temperature reverse bias	1039	Condition A; 1,000 hours	
Electrical measurements		Table I, subgroup 2	
<u>Subgroup 3</u>			3 devices c = 0
DPA	2102		
<u>Subgroup 4</u>			
Thermal impedance curves		Each supplier shall submit their qual-lot average and design maximum thermal impedance curves. In addition, the optimal test conditions and $Z_{\theta JX}$ limit shall be provided to the qualifying activity in the qualification report	Sample size N/A
<u>Subgroups 5 and 6</u>			
Not applicable			
<u>Subgroup 7</u>			45 devices c = 0
Reverse stability	1033	Condition A for devices ≥ 400 V, condition B for devices < 400 V.	

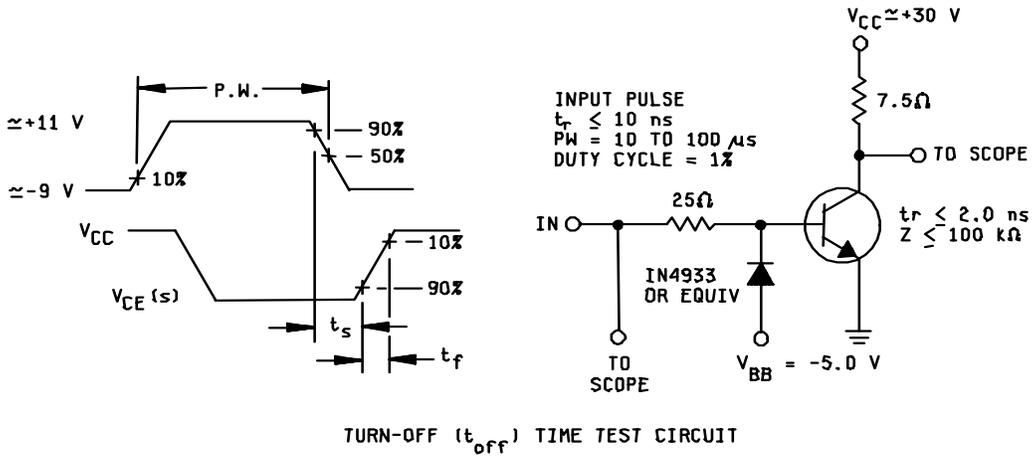
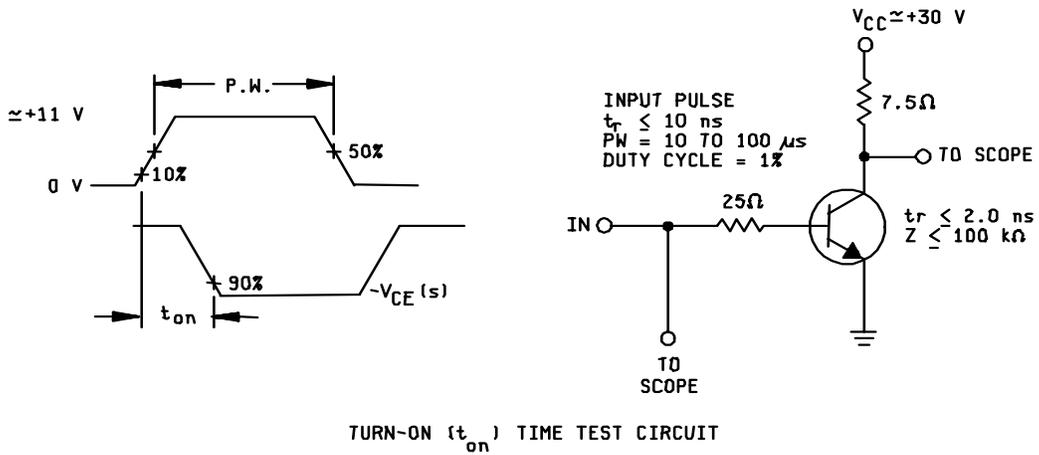


FIGURE 2. Switching time test circuits.

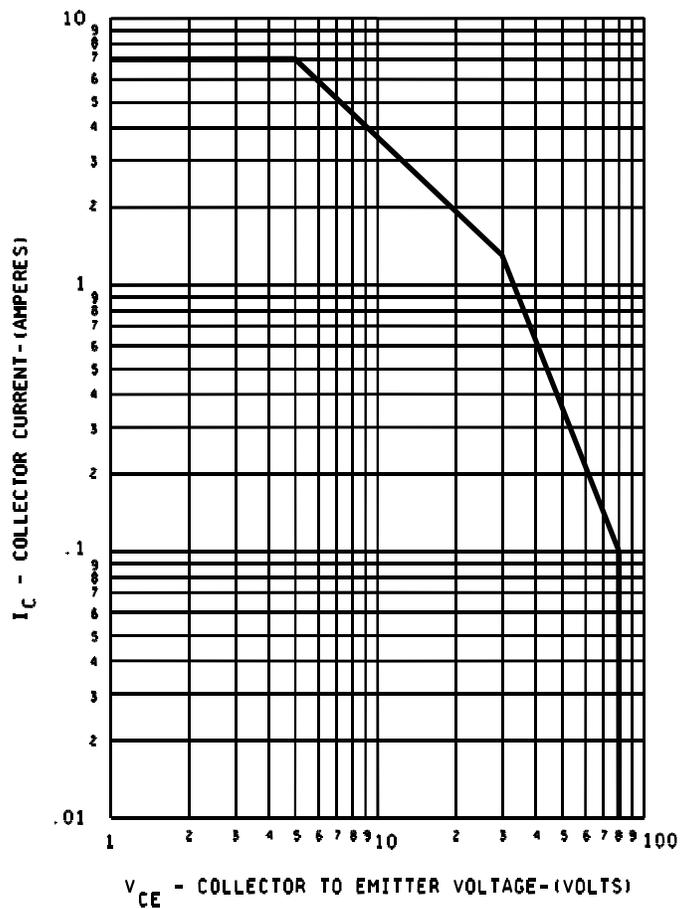


FIGURE 3. Maximum safe operating graph (continuous dc).

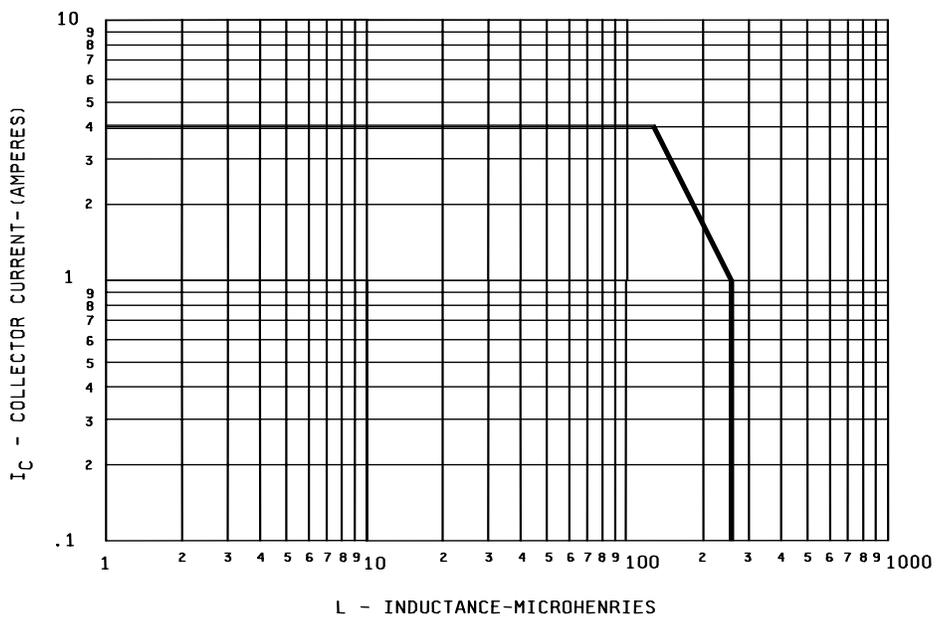


FIGURE 4. Safe operating area for switching between saturation and cutoff (unclamped load).

5. PACKAGING

* 5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

* 6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

* 6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).
- d. Product assurance level and type designator.

* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43216-5000 or email vqe.chief@dla.mil.

* 6.4 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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