The documentation and process conversion measures necessary to comply with this document shall be completed by 18 February 2014.

INCH-POUND

MIL-PRF-19500/613E
18 December 2013
SUPERSEDING
MIL-PRF-19500/613D
21 September 2011

PERFORMANCE SPECIFICATION SHEET

* SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON, POWER,
TYPE 2N7373, JAN, JANTX, JANTXV, JANS AND JANSM, D, P, L, R, F, G, AND H

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 for use in high-speed power switching applications. Four levels of product assurance are provided as specified in MIL-PRF-19500. Provisions for radiation hardness assurance (RHA) to eight radiation levels is provided for JANS product assurance level. RHA level designators "M", "D", "P", "L", "R", "F", "G", and "H" are appended to the device prefix to identify devices, which have passed RHA requirements.

1.2 Physical dimensions. See figure 1 (TO-254AA).

1.3 Maximum ratings. Unless otherwise specified, T_C = +25°C.

Type	P_T (1) T_A = +25°C	P_T (2) T_C = +25°C	$R_{\theta JA}$	$R_{\theta JC}$	V_{CBO}	V_{CEO}	V_{EBO}	I_C	I_C (3)	T_J and T_{STG}
	W	W	°C/W	°C/W	V dc	V dc	V dc	A dc	A dc	°C
2N7373	4	58	43.75	3	100	80	5.0	5.0	10	-65 to +200

(1) Derate linearly 22.8 mW/°C for T_A > +25°C.
(2) Derate linearly 331 mW/°C for T_C > +25°C.
(3) This value applies for PW ≤ 8.3 ms, duty cycle ≤ 1percent.

* Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

1.4 Primary electrical characteristics.

Limit	h_{FE2}	$\|h_{fe}\|$	$V_{BE(SAT)2}$ (1)	$V_{CE(SAT)2}$ (1)	C_{obo}
	V_{CE} = 5.0 V dc I_C = 2.5 A dc	V_{CE} = 5.0 V dc I_C = 500 mA dc f = 10 MHz	I_C = 5.0 A dc I_B = 500 mA dc	I_C = 5.0 A dc I_B = 500 mA dc	V_{CB} = 10 V dc I_E = 0 A dc f = 1 MHz
			V dc	V dc	pF
Min	70	7.0			
Max	200		2.2	1.5	250

(1) Pulse (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.

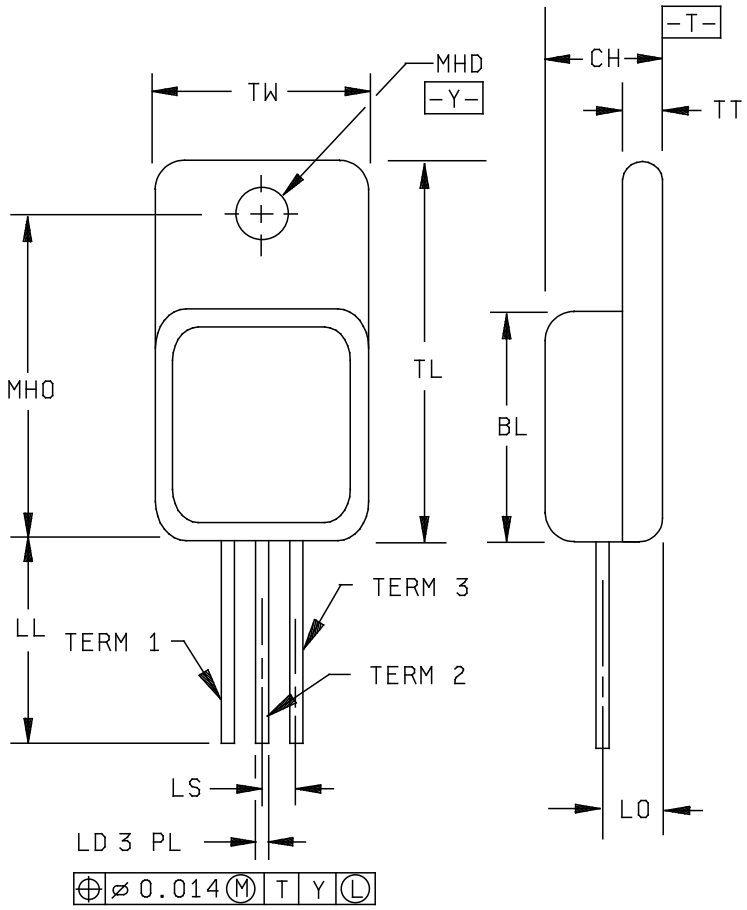
DEPARTMENT OF DEFENSE STANDARDS

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

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

* 2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.535	.545	13.59	13.84
CH	.249	.260	6.32	6.60
LD	.035	.045	0.89	1.14
LL	.510	.570	12.95	14.48
LO	.150 BSC		3.81 BSC	
LS	.150 BSC		3.81 BSC	
MHD	.139	.149	3.53	3.78
MHO	.665	.685	16.89	17.40
TL	.790	.800	20.07	20.32
TT	.040	.050	1.02	1.27
TW	.535	.545	13.59	13.84
Term 1	Base			
Term 2	Collector			
Term 3	Emitter			



NOTES:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. All terminals are isolated from case.
4. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 1. Dimensions and configuration (TO-254AA).

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 requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified on figure 1. Methods used for electrical isolation of the terminal feedthroughs shall employ materials that contain a minimum of 90 percent AL_2O_3 (ceramic). Examples of such construction techniques are metallized ceramic eyelets or ceramic walled packages.

3.4.1 Lead finish and formation. Lead finish shall be solderable in accordance with MIL-STD-750, MIL-PRF-19500, and herein. Where a choice of lead finish or formation is desired, it shall be specified in the acquisition requirements (see 6.2). When lead formation is performed, as a minimum, the vendor shall perform 100 percent hermetic seal in accordance with table E-IV, screen 14, of MIL-PRF-19500.

3.5 Radiation hardness assurance (RHA). Radiation hardness assurance requirements, PIN designators, and test levels shall be as defined in MIL-PRF-19500.

3.6 Marking. Marking shall be in accordance with MIL-PRF-19500. The radiation hardened designator "M", "D", "P", "L", "R", "F", "G", or "H" shall immediately precede (or replace) the device "2N" identifier (depending upon degree of abbreviation required).

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

3.8 Electrical test requirements. The electrical test requirements shall be as specified in table I.

3.9 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 III tests, the tests specified in table III 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 (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with MIL-PRF-19500, table E-IV, 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 E-IV of MIL-PRF-19500)	Measurements	
	JANS level	JANTX and JANTXV levels
(1) 3c	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	I_{CES1} and h_{FE2}	Not applicable
11	Subgroup 2 of table I herein; I_{CES1} and h_{FE2}; ΔI_{CES1} = 100 percent of initial value or 100 nA dc, whichever is greater. Δh_{FE2} = ± 20 percent of initial value.	I_{CES1} and h_{FE2}
12	t = 240 hours	t = 160 hours minimum
13	Subgroups 2 and 3 of table I herein; I_{CES1} and h_{FE2}; ΔI_{CES1} = 100 percent of initial value or 100 nA dc, whichever is greater. Δh_{FE2} = ±20 percent of initial value.	Subgroup 2 of table I herein; I_{CES1} and h_{FE2}; ΔI_{CES1} = 100 percent of initial value or 100 nA dc, whichever is greater. Δh_{FE2} = ±20 percent of initial value.
* 17	For TO-254AA packages: Method 1081 of MIL-STD-750 (see 4.3.3), Endpoints: Subgroup 2 of table I herein.	For TO-254AA packages: Method 1081 of MIL-STD-750 (see 4.3.3), Endpoints: Subgroup 2 of table I herein.

* (1) Shall be performed anytime after temperature cycling, screen 3a; JANTX and JANTXV levels do not need to be repeated in screening requirements.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows: T_J = 187.5 ±12.5°C, $V_{CE} \geq$ 20 V dc, $T_A \leq$ 100°C.

4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3131 of MIL-STD-750 using the guidelines in that method for determining I_M, I_H, t_H, t_{SW}, (and V_H where appropriate). Measurement delay time (t_{MD}) = 70 μs max. See table III, group E, subgroup 4 herein.

* 4.3.3 Dielectric withstanding voltage.

a. Magnitude of test voltage……..900 V dc.

b. Duration of application of test voltage……..15 seconds (min).

c. Points of application of test voltage……..All leads to case (bunch connection).

d. Method of connection……..Mechanical.

e. Kilovolt-ampere rating of high voltage source…….1,200 V/1.0 mA (min).

f. Maximum leakage current……..1.0 mA.

g. Voltage ramp up time.....500 V/second.

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 table E-V of MIL-PRF-19500, and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VIA (JANS) and table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

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

Subgroup	Method	Condition
B4	1037	V_{CB} = 10 V dc minimum.
B5	1027	See 4.5.3.

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

Subgroup	Method	Condition
B3	1037	V_{CB} = 10 V dc minimum.

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

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

Subgroup	Method	Condition
C2	2036	Tense: test condition A; weight 10 pounds ± 5 ounces (4.54 Kg ±142 g); time 15 seconds. Bend strength: test condition F; bending stress 2 pounds, time 15 seconds.
C5	3131	See 4.3.2, $R_{\theta JC}$ = 3.0°C/W.
C6	1037	V_{CB} = 10 V dc minimum.

4.4.4 Group D inspection. Conformance inspection for hardness assured JANS types shall include the group D tests specified in table II herein. These tests shall be performed as required in accordance with MIL-PRF-19500 and method 1019 of MIL-STD-750, for total ionizing dose or method 1017 of MIL-STD-750 for neutron fluence as applicable (see 6.2 herein), except group D, subgroup 2 may be performed separate from other subgroups. Group D inspection may also be performed ahead of the screening lot using die selected in accordance with MIL-PRF-19500 and related documents. Alternate package options may also be substituted for the testing provided there is no adverse effect to the fluence profile.

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

4.5 Method 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 Inspection conditions. Unless otherwise specified in MIL-PRF-19500 or herein, all inspections shall be conducted at a case temperature (T_C) of +25°C ±3°C.

4.5.3 Group B accelerated life test. This test shall be conducted using one of the two options listed herein (4.5.3.a and 4.5.3.b) with the following conditions applying to all options: V_{CB} = 20 V minimum dc; 96 hours minimum; T_J = +275°C.

a. P_T = 2.5; P_T adjusted to give a lot average of T_J = +275°C with T_A = +125°C ± 25°C.

b. T_A = +25°C ±3°C with P_T adjusted to give a lot average of T_J = +275°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						
Thermal impedance 2/	3131	See 4.3.2	$Z_{\theta JX}$			°C/W
Collector to emitter breakdown voltage	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	I_{CES1}		1.0	µA dc
Collector to emitter cutoff current	3041	Bias condition C; V_{CE} = 100 V dc; V_{BE} = 0	I_{CES2}		1.0	mA dc
Collector to emitter cutoff current	3041	Bias condition D; V_{CE} = 40 V dc; I_B = 0	I_{CEO}		50	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 4 dc; I_C = 0	I_{EBO1}		1.0	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 5.5 dc; I_C = 0	I_{EBO2}		1.0	mA dc
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 50 mA dc; pulsed (see 4.5.1)	h_{FE1}	50		
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 2.5 A dc; pulsed (see 4.5.1)	h_{FE2}	70	200	
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 5.0 A dc; pulsed (see 4.5.1)	h_{FE3}	40		
Base to emitter non-saturated voltage	3066	Test condition B; V_{CE} = 5.0 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	V_{BE}		1.45	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 2.5 A dc I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)1}$		1.45	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 5.0 A dc I_B = 500 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)2}$		2.2	V dc
Collector to emitter saturated voltage	3071	I_C = 2.5 A dc; I_B = 250 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.75	V dc
Collector to emitter saturated voltage	3071	I_C = 5.0 A dc; I_B = 500 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)2}$		1.5	V dc

See footnotes 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_{CE} = 60 V dc V $_{BE(OFF)}$ = +2 V dc	I_{CEX}		500	µA dc
Low-temperature operation:		T_A = -55°C				
Forward-current transfer ratio		V_{CE} = 5.0 V dc; I_C = 2.5 A dc; pulsed (see 4.5.1)	h_{FE4}	25		
Subgroup 4						
Common emitter, small-signal short-circuit forward-current transfer ratio	3076	V_{CE} = 5 V dc; I_C = 100 mA dc; f = 1 kHz	h_{fe}	50		
Magnitude of common emitter small-signal short-circuit forward-current transfer ratio	3206	V_{CE} = 5 V dc; I_C = 500 mA dc; f = 10 MHz	$\|h_{fe}\|$	7		
Open circuit output capacitance	3236	V_{CB} = 10 V dc; I_E = 0; 100 kHz ≤ f ≤ 1 MHz	C_{obo}		250	pF
Switching time	3251	I_C = 5 A dc; I_{B1} = 500 mA dc	t_{on}		0.5	µs
		I_{B2} = -500 mA dc	t_s		1.4	µs
		$V_{BE(off)}$ = 3.7 V dc	t_f		0.5	µs
		R_L = 6 Ω; (see figure 2)	t_{off}		1.5	µs

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 5						
Safe operating area (continuous dc)	3055	Pre-pulse condition for each test: V_{CE} = 0; I_C = 0; T_C = +25°C Pulse condition for each test: t_p = 1 second, 1 cycle T_C = +25°C, (see figure 3)				
Test 1		V_{CE} = 12 V dc; I_C = 5 A dc				
Test 2		V_{CE} = 32 V dc; I_C = 1.5 A dc				
Test 3		V_{CE} = 80 V dc; I_C = 100 mA dc				
Safe operating area (unclamped inductive)		T_C = +25°C; R_{BB1} = 10 ohms; R_{BB2} = 100 ohms; L = 0.3 mH; R_L = 0.1 ohms; V_{CC} = 10 V dc; I_{CM} = 10 A dc; (see figure 4)				
Electrical measurements		Table I, subgroup 2				
Subgroups 6 and 7						
Not applicable						

1/ For sampling plan, see MIL-PRF-19500.
2/ This test required for the following end-point measurements only:
Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).
Group B, subgroups 3 and 4 (JANS).
Group C, subgroup 2 and 6.
Group E, subgroup 1.

TABLE II. Group D inspection.

Inspection 1/ 2/ 3/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1 4/						
Neutron irradiation	1017	Neutron exposure V_{CES} = 0 V				
Collector to emitter breakdown voltage	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	I_{CES1}		2.0	µA dc
Collector to emitter cutoff current	3041	Bias condition C; V_{CE} = 100 V dc; V_{BE} = 0	I_{CES2}		2.0	mA dc
Collector to emitter cutoff current	3041	Bias condition D; V_{CE} = 40 V dc; I_B = 0	I_{CEO}		100	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 4 dc; I_C = 0	I_{EBO1}		2.0	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 5.5 dc; I_C = 0	I_{EBO2}		2.0	mA dc
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 50 mA dc; pulsed (see 4.5.1)	$[h_{FE1}]$ 5/	[25]		
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 2.5 A dc; pulsed (see 4.5.1)	$[h_{FE2}]$ 5/	[35]	200	
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 5.0 A dc; pulsed (see 4.5.1)	$[h_{FE3}]$ 5/	[20]		
Base to emitter non-saturated voltage	3066	Test condition B; V_{CE} = 5.0 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	V_{BE}		1.67	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 2.5 A dc I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)1}$		1.67	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 5.0 A dc I_B = 500 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)2}$		2.53	V dc
Collector to emitter saturated voltage	3071	I_C = 2.5 A dc; I_B = 250 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.86	V dc
Collector to emitter saturated voltage	3071	I_C = 5.0 A dc; I_B = 500 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)2}$		1.73	V dc

See footnotes at end of table.

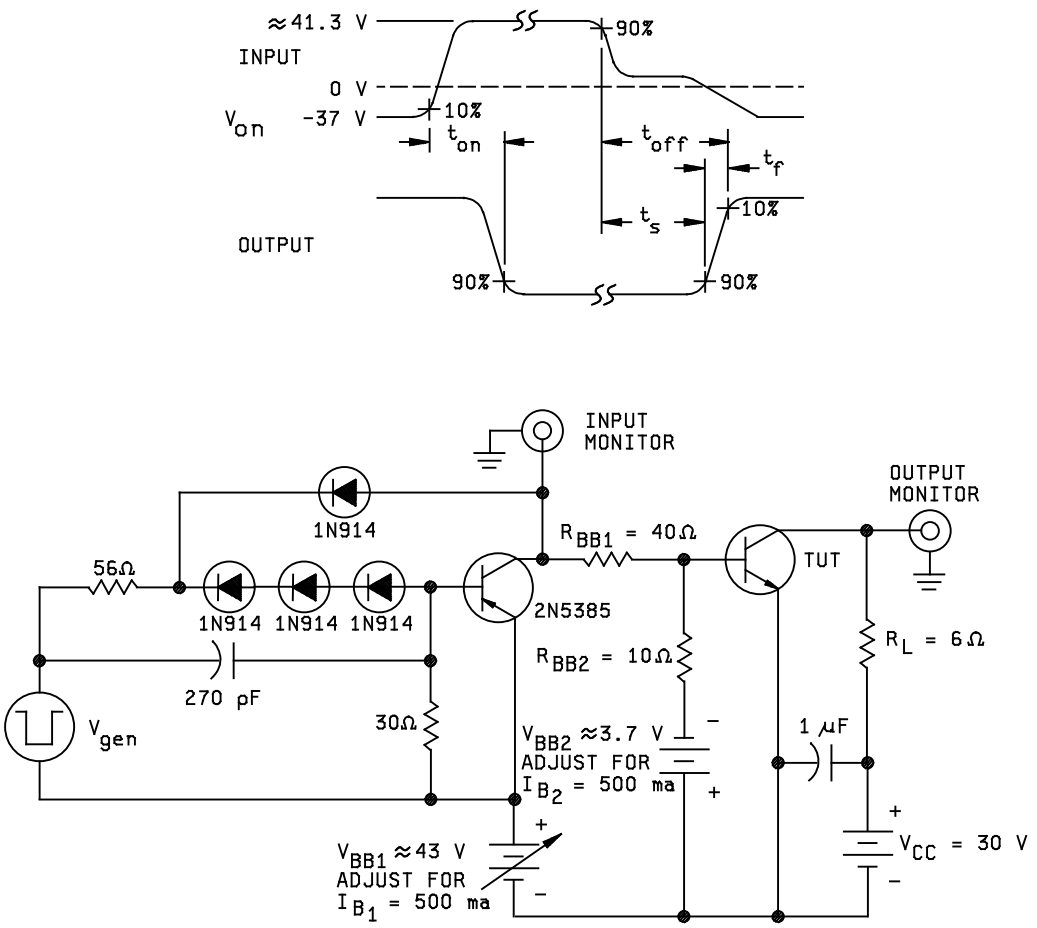
TABLE II. Group D inspection - Continued.

Inspection 1/ 2/ 3/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 2						
Total dose irradiation	1019	Gamma exposure V_{CES} = 64 V, condition A				
Collector to emitter breakdown voltage	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	I_{CES1}		2.0	µA dc
Collector to emitter cutoff current	3041	Bias condition C; V_{CE} = 100 V dc; V_{BE} = 0	I_{CES2}		2.0	mA dc
Collector to emitter cutoff current	3041	Bias condition D; V_{CE} = 40 V dc; I_B = 0	I_{CEO}		100	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 4 dc; I_C = 0	I_{EBO1}		2.0	µA dc
Emitter to base cutoff current	3061	Bias condition D; V_{EB} = 5.5 dc; I_C = 0	I_{EBO2}		2.0	mA dc
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 50 mA dc; pulsed (see 4.5.1)	$[h_{FE1}]$ 5/	[25]		
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 2.5 A dc; pulsed (see 4.5.1)	$[h_{FE2}]$ 5/	[35]	200	
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc; I_C = 5.0 A dc; pulsed (see 4.5.1)	$[h_{FE3}]$ 5/	[20]		
Base to emitter non-saturated voltage	3066	Test condition B; V_{CE} = 5.0 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	V_{BE}		1.67	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 2.5 A dc I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)1}$		1.67	V dc
Base to emitter saturated voltage	3066	Test condition A; I_C = 5.0 A dc I_B = 500 mA dc, pulsed (see 4.5.1)	$V_{BE(SAT)2}$		2.53	V dc
Collector to emitter saturated voltage	3071	I_C = 2.5 A dc; I_B = 250 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.86	V dc
Collector to emitter saturated voltage	3071	I_C = 5.0 A dc; I_B = 500 mA dc; pulsed (see 4.5.1)	$V_{CE(sat)2}$		1.73	V dc

1/ Tests to be performed on all devices receiving radiation exposure.
2/ For sampling plan, see MIL-PRF-19500.
3/ Electrical characteristics apply to all device types unless otherwise noted.
4/ Subgroup 1 is an optional test and must be specified on the purchasing contract when required.
5/ See method 1019 of MIL-STD-750 for how to determine $[h_{FE}]$ by first calculating the delta $(1/h_{FE})$ from the pre- and Post-radiation h_{FE}. Notice the $[h_{FE}]$ is not the same as h_{FE} and cannot be measured directly. The $[h_{FE}]$ value can never exceed the pre-radiation minimum h_{FE} that it is based upon.

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

Inspection	MIL-STD-750		Sample plan
	Method	Conditions	
Subgroup 1			45 devices c = 0
Temperature cycling	1051	500 cycles.	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table I, subgroup 2 herein.	
Subgroup 2			45 devices c = 0
Blocking life	1048	Test temperature = +125°C; V_{CB} = 80 percent rated; T = 1,000 hours.	
Electrical measurements		See table I, subgroup 2 herein.	
Subgroup 4			Sample size N/A
Thermal impedance curves		See MIL-PRF-19500.	
Subgroup 8			45 devices c = 0
Reverse stability	1033	Condition B.	



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 ≤ 2 percent.
3. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{IN} \geq 10$ MΩ, $C_{IN} \leq 11.5$ pF.
3. Resistors shall be noninductive types.
4. The dc power supplies may require additional bypassing in order to minimize ringing.

FIGURE 2. Switching time test circuit.

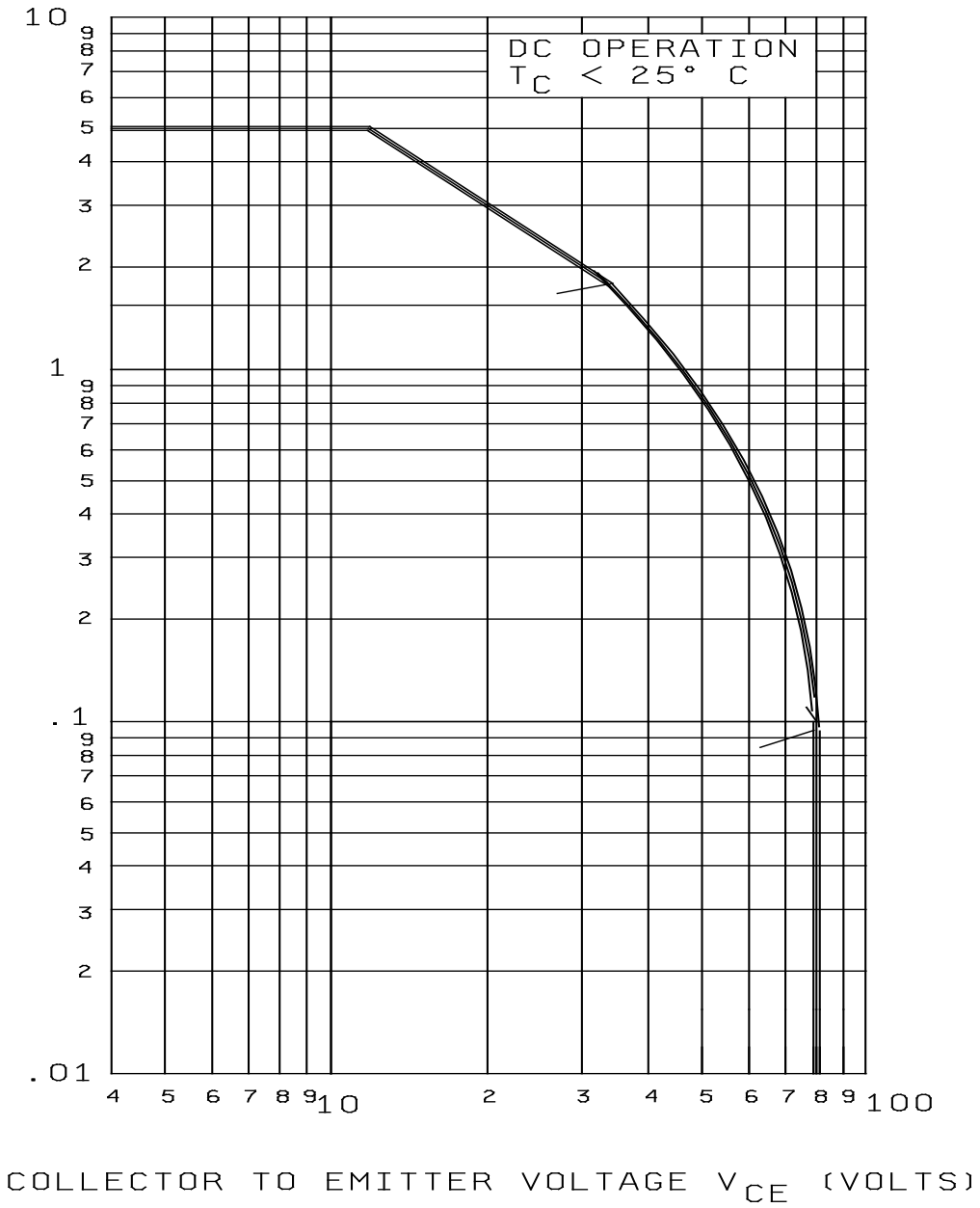


FIGURE 3. Maximum safe operating area.

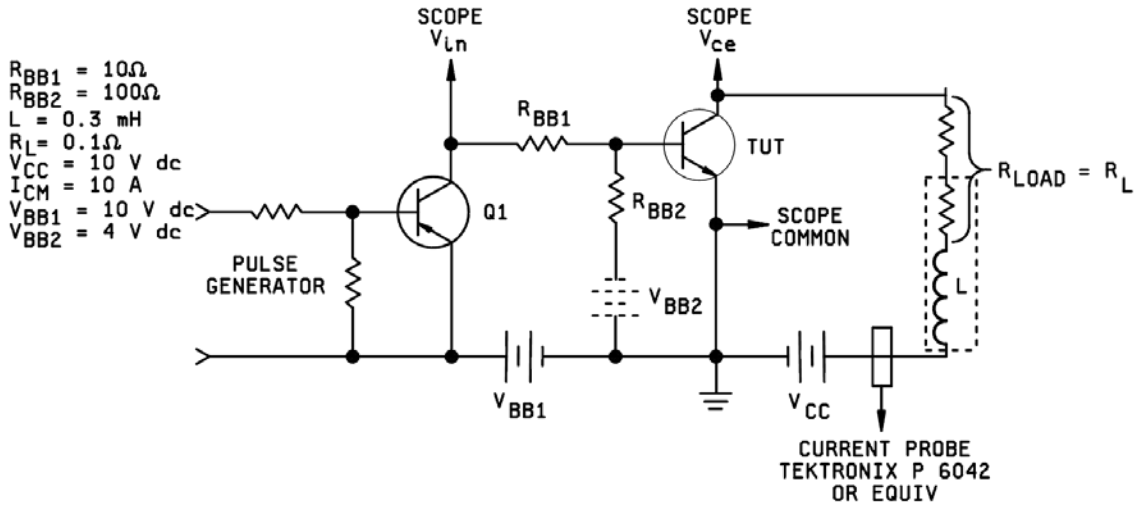


FIGURE 4. Unclamped inductive load energy test circuit.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When 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. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

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.

e. For acquisition of RHA designated devices, table II, subgroup 1 testing of group D herein is optional. If subgroup 1 is desired, it must be specified in the contract.

* 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 DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.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.

Custodians:
Army - CR
Navy - EC
Air Force - 85
NASA - NA
DLA - CC

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

Preparing activity:
DLA - CC

(Project 5961-2014-024)

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil.