

The documentation and process conversion measures necessary to comply with this revision shall be completed by 23 September 2016.

INCH-POUND

MIL-PRF-19500/287H
24 June 2016
SUPERSEDING
MIL-PRF-19500/287G
8 May 2008

PERFORMANCE SPECIFICATION SHEET
TRANSISTOR, NPN, SILICON, SWITCHING,
THROUGH HOLE MOUNT PACKAGE, TYPE 2N3013,
QUALITY LEVELS JAN AND JANTX

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 switching transistors. Two levels of product assurance (JAN and JANTX) are provided for each device type as specified in [MIL-PRF-19500](#).

1.2 Package outline. The device package outline is a TO-52 in accordance with [figure 1](#) for all encapsulated device types.

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

Types	P_T (1) $T_A = +25^\circ\text{C}$	P_T (2) $T_C = +25^\circ\text{C}$	V_{CBO}	V_{CEO}	I_C	I_C	$R_{\theta JA}$	$R_{\theta JC}$	T_{STG} and T_{OP}
	<u>W</u>	<u>W</u>	<u>V dc</u>	<u>V dc</u>	<u>V dc</u>	<u>mA dc</u>	<u>°C/W</u>	<u>°C/W</u>	<u>°C</u>
2N3013	0.36	1.2	40	20	5.0	300	476	146	-65 to +200

(1) Derate linearly, 2.10 mW/°C for $T_A = 25^\circ\text{C}$.

(2) Derate linearly, 6.86 mW/°C for $T_C = 25^\circ\text{C}$.

1.4 Primary electrical characteristics. Unless otherwise specified, at $T_A = +25^\circ\text{C}$.

Limit	h_{FE1} (1) $V_{CE} = 0.4 \text{ V dc}$ $I_C = 30 \text{ mA dc}$	$V_{CE(sat)1}$ (1) $I_C = 30 \text{ mA dc}$ $I_B = 3.0 \text{ mA dc}$	$V_{BE(sat)2}$ (1) $I_C = 30 \text{ mA dc}$ $I_B = 3.0 \text{ mA dc}$	t_{on}	t_{off}	$ h_{fe} $ $V_{CE} = 10 \text{ V dc}$ $I_C = 30 \text{ mA dc}$ $f = 100 \text{ MHz}$
				$I_C = 300 \text{ mA dc}$ $I_{B1} = 30 \text{ mA dc}$ $V_{CC} = 15 \text{ V dc}$	$I_C = 300 \text{ mA dc}$ $I_{B1} = 30 \text{ mA dc}$ $I_{B2} = 30 \text{ mA dc}$	
Minimum	35	<u>V dc</u>	<u>V dc</u>	<u>ns</u>	<u>ns</u>	35
Maximum	120	0.18	0.95	15	25	12

(1) Pulsed (see 4.5.1).

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>.



1.5 Part or Identifying Number (PIN). The PIN is in accordance with [MIL-PRF-19500](#), and as specified herein. See [6.4](#) for PIN construction example and [6.5](#) for a list of available PINs.

1.5.1 JAN certification mark and quality level. The quality level designator, if applicable, is in accordance with [MIL-PRF-19500](#). The quality level designators for encapsulated devices that are applicable for this specification sheet from the lowest to the highest level are as follows: "JAN" and "JANTX".

1.5.2 Device type. The designation system for the devices covered by this specification sheet is as follows.

1.5.2.1 First number and first letter symbols. The devices of this specification sheet use the first number and letter symbols "2N".

1.5.2.2 Second number symbols. The second number symbols for the devices covered by this specification sheet are "3013".

1.5.3 Suffix symbols. Suffix symbols are not applicable to this specification sheet.

1.5.4 Lead finish. The lead finishes applicable to this specification sheet are listed on [QPDSIS-19500](#).

2. APPLICABLE DOCUMENTS.

2.1 General. The documents listed in this section are specified in sections [3](#) and [4](#) 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](#) and [4](#) 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://quicksearch.dla.mil>.)

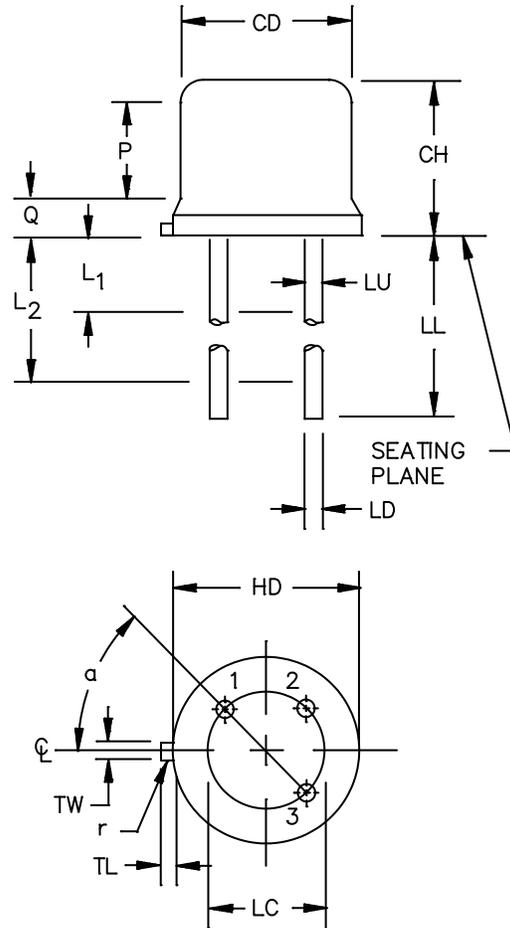
2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific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

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 manufacturer's list (QML) before contract award (see [4.2](#) and [6.3](#)).

Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	
CH	.170	.210	4.32	5.33	
HD	.209	.230	5.31	5.84	
LC	.100 TP		2.54 TP		6
LD	.016	.021	0.41	0.53	7,8
LL	.500	.750	12.7	19.05	7,8,13
LU	.016	.019	0.41	0.48	7,8
L ₁		.050		1.27	7,8
L ₂	.250		6.35		7,8
P	.100		2.54		
Q		.030		0.76	5
TL	.028	.048	0.71	1.22	3,4
TW	.036	.046	0.91	1.17	3
r		.010		0.25	10
α	45° TP		45° TP		6



NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TL shall be held for a minimum length of .011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
7. Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
8. All three leads.
9. The collector shall be electrically connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

FIGURE 1. Physical dimensions (similar to TO-52).

3.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein shall be as specified in [MIL-PRF-19500](#).

3.4 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-19500](#) and herein. Current density of internal conductors shall be as specified in [MIL-PRF-19500](#).

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](#). The PIN shall be in accordance with [1.5](#). At the option of the manufacturer, the marking of the country of origin may be omitted from the body of the transistor.

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 as specified in [table I](#).

3.8 Workmanship. 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, II, and III](#)).

4.2 Qualification inspection. Qualification inspection shall be in accordance with [MIL-PRF-19500](#) and as specified herein.

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](#) herein 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. Screening shall be in accordance with table E-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	Measurement
	Quality level JANTX
3 (1)	Thermal impedance, method 3131 of MIL-STD-750
9	Not applicable
11	I_{CES1} and h_{FE1}
12	See 4.3.1
13	Subgroup 2 of table I herein, $\Delta I_{CES1} = 100$ percent of initial value or 50 nA dc, whichever is greater. $\Delta h_{FE1} = \pm 20$ percent of initial value.

- (1) Shall be performed anytime after temperature cycling, screen 3a; and does not need to be repeated in screening requirements.

4.3.1 Power burn-in conditions. Power burn-in conditions shall be as follows: $V_{CB} = 10$ to 30 V dc. Power shall be applied to achieve $T_J = +135^\circ\text{C}$ minimum using a minimum $P_D = 75$ percent of P_T maximum rated as defined in 1.3. With approval of the qualifying activity and preparing activity, alternate burn-in criteria (hours, bias conditions, T_J , and mounting conditions) may be used for JANTX quality levels. A justification demonstrating equivalence is required. In addition, the manufacturing site's burn-in data and performance history will be essential criteria for burn-in modification approval.

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} (V_C and V_H where appropriate). See table III, group E, subgroup 4 herein.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein. If alternate screening is being performed in accordance with MIL-PRF-19500, a sample of screened devices shall be submitted to and pass the requirements of subgroup 1 and 2, of table I herein, inspection only (table E-VIB), subgroup 1 is not required to be performed since solderability and resistance to solvents testing is performed in table I herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E-VIC (small die flow) of MIL-PRF-19500 and herein. Delta measurements for JAN and JANTX shall be after each step and shall be in accordance with table I, subgroup 2 and table II herein.

<u>Step</u>	<u>Method</u>	<u>Condition</u>
1	1026	Steady-state operating life: 1,000 hours minimum, $V_{CB} = 10$ dc, power and ambient shall be applied to achieve $T_J = +150^\circ\text{C}$ minimum using a minimum of $P_D = 75$ percent of maximum rated P_T as defined in 1.3. $n = 45$ devices, $c = 0$. The sample size may be increased and the test time decreased as long as the devices are stressed for a total of 45,000 device hours minimum, and the actual time of test is at least 340 hours.
2	1048	Blocking life: $T_A = +150^\circ\text{C}$, $V_{CB} = 80$ percent of rated voltage, 48 hours minimum. $n = 45$ devices, $c = 0$.
3	1032	High-temperature life (non-operating): $t = 340$ hours, $T_A = +200^\circ\text{C}$, $n = 22$, $c = 0$.

4.4.2.1 Sample selection. Samples selected for group B inspection shall meet all of the following requirements:

- 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.
- Samples shall be selected 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 may be pulled prior to the application of final lead finish.
- Separate samples may be used for each step.

4.4.2.2 Failures. In the event of a lot failure, the resubmission requirements of MIL-PRF-19500 shall apply. In addition, all catastrophic failures during conformance inspection shall be analyzed to the extent possible to identify root cause and corrective action. Whenever a failure is identified as wafer lot and wafer processing related, the entire wafer lot and related devices assembled from the wafer lot shall be rejected unless an appropriate determined corrective action to eliminate the failures mode has been implemented and the devices from the wafer lot are screened to eliminate the failure mode.

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](#) and herein. Delta measurements shall be in accordance with [table II](#) herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	1056	Thermal shock, test condition A.
C2	2036	Terminal strength, test condition E.
C5	3131	$R_{\theta JA}$ and $R_{\theta JC}$ only (see 1.3).
C6		Not applicable.

4.4.3.1 Sample selection. Samples for group C inspection shall be chosen at random from any inspection lot containing the intended package type and lead finish procured to the same specification which is submitted to and passes [table I](#) 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 qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the associated specification that did not request the performance of [table III](#) tests, the tests specified in [table III](#) herein shall be performed by the first inspection lot of this revision to maintain qualification.

4.5 Methods of inspection. The methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. The conditions for pulse measurement shall be as specified in section 4 of [MIL-STD-750](#).

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TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1 2/						
Visual and mechanical inspection 3/	2071	n = 45 devices, c = 0				
Solderability 3/	2026	n = 15 leads, c = 0				
Resistance to solvents 3/ 4/	1022	n = 15 devices, c = 0				
Salt atmosphere	1041	n = 6, c = 0 (for laser marked devices only)				
Temp cycling 3/	1051	Test condition C, 25 cycles. n = 22 devices, c = 0				
Hermetic seal 5/ Fine leak Gross leak	1071	n = 22 devices, c = 0				
Electrical measurements		Table I, subgroup 2				
Bond strength 3/	2037	Precondition T _A = +250°C at t = 24 hours or T _A = +300°C at t = 2 hours; n = 11 wires, c = 0				
Decap internal visual (design verification)	2075	n = 4 devices, c = 0				
Subgroup 2						
Thermal impedance 6/	3131	See 4.3.2	Z _{θJX}			°C/W
Breakdown to voltage, collector to base	3001	Bias condition D, I _C = 100 μA dc	V _{(BR)CBO}	40		V dc
Breakdown voltage, collector to emitter	3011	Bias condition D, I _C = 10 mA dc pulsed (see 4.5.1)	V _{(BR)CEO}	20		V dc
Breakdown voltage, collector to emitter	3011	Bias condition C, I _C = 100 μA dc	V _{(BR)CES}	40		V dc
Breakdown voltage emitter to base	3026	Bias condition D, I _E = 100 μA dc	V _{(BR)EBO}	5		V dc
Collector to emitter cutoff current	3041	Bias condition C, V _{CE} = 20 V dc V _{BE} = 0	I _{CES1}		300	nA dc

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 2</u> – Continued						
Forward-current transfer ratio	3076	$V_{CE} = 0.4 \text{ V dc}; I_C = 30 \text{ mA dc};$ pulsed (see 4.5.1)	h_{FE1}	35	120	
Forward-current transfer ratio	3076	$V_{CE} = 0.5 \text{ V dc}; I_C = 100 \text{ mA dc};$ pulsed (see 4.5.1)	h_{FE2}	30		
Forward-current transfer ratio	3076	$V_{CE} = 1.0 \text{ V dc}; I_C = 300 \text{ mA dc};$ pulsed (see 4.5.1)	h_{FE3}	15		
Collector to emitter voltage (saturated)	3071	$I_C = 30 \text{ mA dc}; I_B = 3.0 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.18	V dc
Collector to emitter voltage (saturated)	3071	$I_C = 100 \text{ mA dc}; I_B = 10 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{CE(sat)2}$		0.28	V dc
Collector to emitter voltage (saturated)	3071	$I_C = 300 \text{ mA dc}; I_B = 30 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{CE(sat)3}$		0.50	V dc
Base to emitter voltage (saturated)	3066	Test condition A; $I_C = 30 \text{ mA dc};$ $I_B = 10 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{BE(sat)1}$	0.75	0.95	V dc
Base to emitter voltage (saturated)	3066	Test condition A; $I_C = 100 \text{ mA dc};$ $I_B = 10 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{BE(sat)2}$		1.20	V dc
Base to emitter voltage (saturated)	3066	Test condition A; $I_C = 300 \text{ mA dc};$ $I_B = 30 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{BE(sat)3}$		1.70	V dc
<u>Subgroup 3</u>						
High-temperature operation:		$T_A = +125^\circ\text{C}$				
Collector to emitter cutoff current	3041	Bias condition D, $V_{CB} = 20 \text{ V dc}$ $V_{BE} = 0$	I_{CES2}		40	$\mu\text{A dc}$
Collector to emitter voltage (saturated)	3071	$I_C = 30 \text{ mA dc}; I_B = 3.0 \text{ mA dc};$ pulsed (see 4.5.1)	$V_{CE(sat)4}$		0.25	V dc
Low-temperature operation:		$T_A = -55^\circ\text{C}$				
Forward-current transfer ratio	3076	$V_{CE} = 0.4 \text{ V dc}; I_C = 30 \text{ mA dc}$ pulsed (see 4.5.1)	h_{FE4}	15		

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 4</u>						
Open circuit output capacitance	3236	$V_{CB} = 5 \text{ V dc}; I_E = 0;$ $f = 140 \text{ kHz}$	C_{obo}		5	pF
Input capacitance (output open-circuited)	3240	$V_{EB} = 0.5 \text{ V dc}; I_C = 0;$ $f = 140 \text{ kHz}$	C_{ibo}		8	pF
Magnitude of common emitter, small-signal short-circuit forward-current transfer ratio	3306	$V_{CE} = 10 \text{ V dc}; I_C = 30 \text{ mA dc};$ $f = 100 \text{ MHz}$	$ h_{FE} $	3.5	12	
Saturated turn-on time	3251	$I_C = 300 \text{ mA dc}; I_B = 30 \text{ mA dc};$ $V_{CC} = 15 \text{ V dc};$ (see figure 2); test condition A	t_{on}		15	ns
Saturated turn-off time	3251	$I_C = 300 \text{ mA dc}; I_{B1} = I_{B2} = 30$ $\text{mA dc}; V_{CC} = 15 \text{ V dc};$ (see figure 2); test condition A	t_{off}		25	ns
Storage time	3251	Test condition A; $I_C = 10 \text{ mA dc};$ $I_{B1} = I_{B2} = -10 \text{ mA dc}$ (see figure 3)	t_s		18	ns
<u>Subgroups 5, 6, and 7</u>						
Not applicable						

1/ For sampling plan see [MIL-PRF-19500](#).

2/ For resubmission of failed test subgroup of [table I](#), double the sample size of the failed test or sequence of tests. A failure in [table I](#), subgroup 1 shall not require retest of the entire subgroup. Only the failed test shall be rerun upon submission.

3/ Separate samples may be used.

4/ Not required for laser marked devices.

5/ This hermetic seal test is an end-point to temp-cycling in addition to electrical measurements.

6/ This test required for the following end-point measurements only:

Group B, step 1.

Group C, subgroups 2 and 6.

Group E, subgroup 1.

TABLE II. Groups B and C delta measurements.

Step	Inspection <u>1/</u> <u>2/</u>	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Forward-current transfer ratio	3076	$V_{CE} = 0.4 \text{ V dc}$; $I_C = 30 \text{ mA dc}$ pulsed (see 4.5.1)	Δh_{FE1}	±25 percent change from initial value.		

1/ The delta measurements for 4.4.2 herein (JAN and JANTX) are as follows: Subgroups 3 and 6, see table II herein.

2/ The delta measurements for table E-VII of MIL-PRF-19500 are as follows: Subgroup 6, see table II herein.

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

Inspection	MIL-STD-750		Sample plan
	Method	Condition	
<u>Subgroup 1</u>			45 devices c = 0
Temperature cycling (air to air)	1051	Test condition C, 500 cycles.	
Hermetic seal	1071		
Fine leak			
Gross leak			
Electrical measurements		See table I, subgroup 2 and table II herein.	
<u>Subgroup 2</u>			45 devices c = 0
Intermittent life	1037	$V_{CB} = 10 \text{ V dc}$, 6,000 cycles. Adjust device current, or power, to achieve a minimum ΔT_J of 100°C.	
Electrical measurements		See table I, subgroup 2 and table II herein.	
<u>Subgroups 3</u>			
Not applicable			
<u>Subgroup 4</u>			
Thermal impedance curves		See MIL-PRF-19500, table E-IX, subgroup 4.	
<u>Subgroup 5, 6, and 7</u>			
Not applicable			
<u>Subgroup 8</u>			45 devices c = 0
Reverse stability	1033	Condition B.	

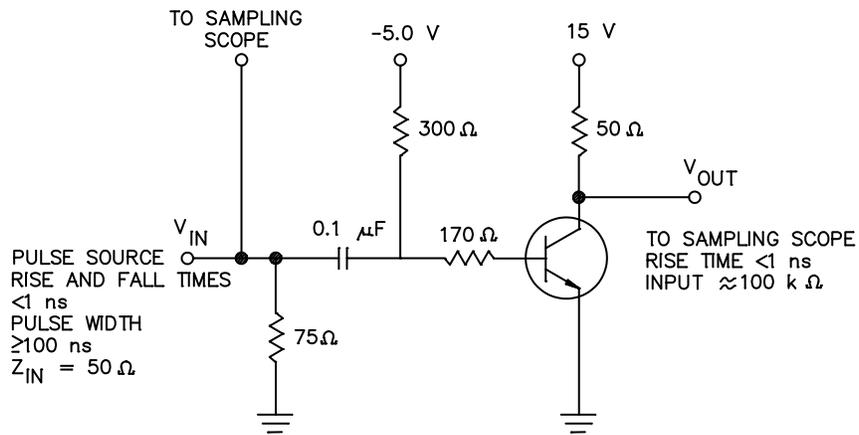


FIGURE 2. T_{on} and T_{off} test circuit.

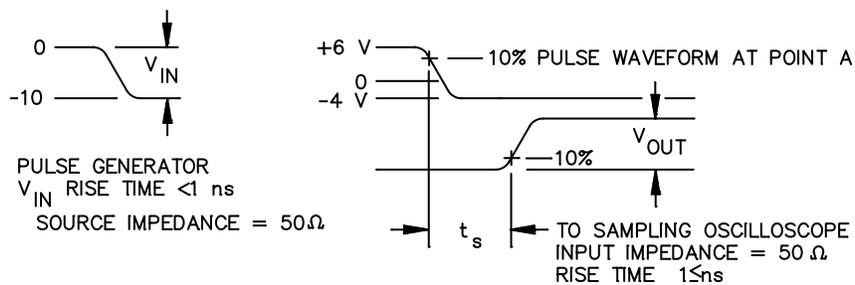
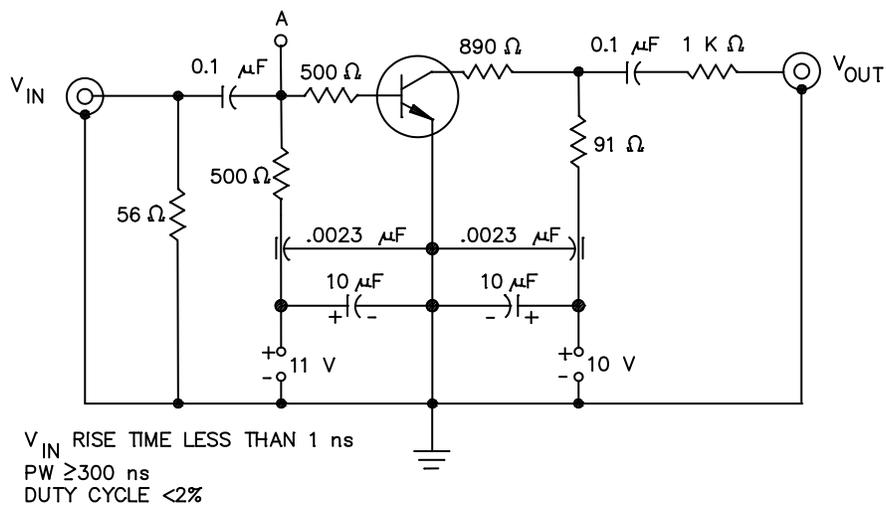


FIGURE 3. Charge storage time test circuit.

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.)

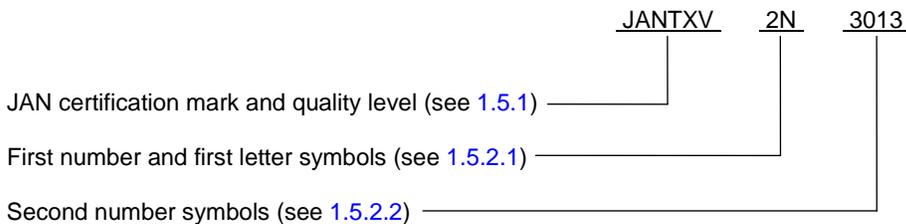
6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

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. The complete PIN, see [1.5](#) and 6.4.

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 PIN construction example. The PINs for encapsulated are constructed using the following form.



6.5 List of PINs. The following is a list of possible PINs available for encapsulated devices covered by this specification sheet: "JAN2N3013" and "JANTX2N3013".

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6.6 Supersession information. Devices covered by this specification supersedes the manufacturers' and users' Part or Identifying Number (PIN). This information in no way implies that manufacturers' PIN's are suitable as a substitute for the military PIN.

Military PIN	Manufacturers' CAGE code	Manufacturers' and users' PIN
2N3013	04713	SS5623H ST1334H SUN0520H1 SUN1015H SUN1051H1

6.7 Request for new types and configurations. Requests for new device types or configurations for inclusions in this specification sheet should be submitted to: DLA Land and Maritime, ATTN: VAC, Post Office Box 3990, Columbus, OH 43218-3990 or by electronic mail at Semiconductor@dla.mil or by facsimile (614) 693-1642 or DSN 850-6939.

6.8 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.

Custodians:
Army – CR
Navy – EC
Air Force – 85
DLA – CC

Preparing activity:
DLA – CC

(Project 5961-2016-060)

Review activities:
Army – MI, SM
Navy – AS, OS, SH

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>.